Final

Application for Certification for the San Francisco Electric Reliability Project
Volume II - Appendices

Submitted to

California Energy Commission

Applicant

City and County of San Francisco

March 2004

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

CH2MHILL

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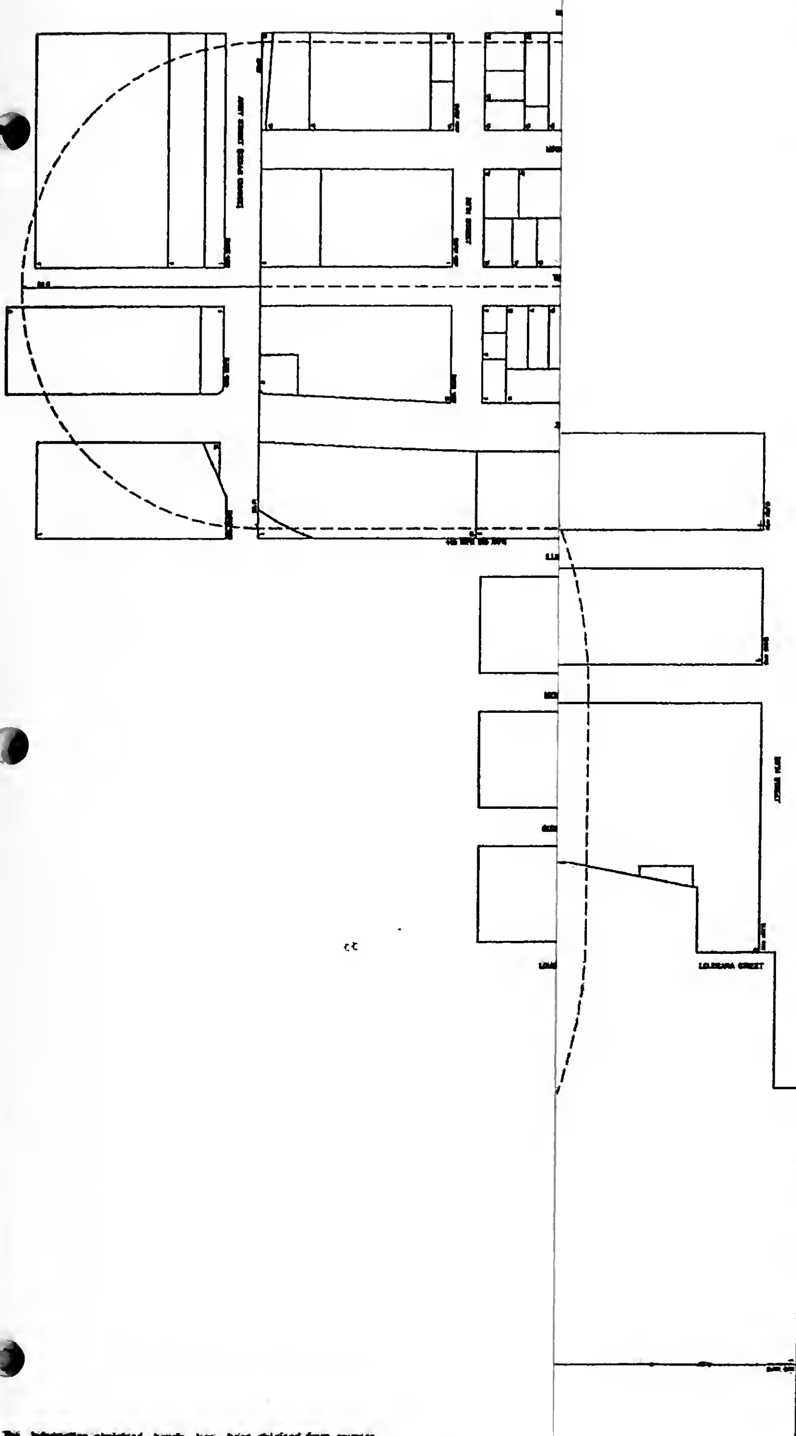
APPENDIX 1A

Owners Adjacent to the Project Site and Linear Corridors



RADIUS

448 Grant Avenue Suite 400
San Francisco, CA 94108-3208
(415) 391-4775

BLOCK 4175
LOT 6

San Francisco, CA

SCALE: 1"=140'-0"

[redacted]

[redacted]

JOB NO:	DATE: 040219
41750000	DRAWN: DC
	CHECKED: DC

AREA RADIUS MAP

[redacted]

This information contained herein has been obtained from sources that we deem reliable and current at the time of preparation. We have no reason to doubt its accuracy but we do not guarantee it.

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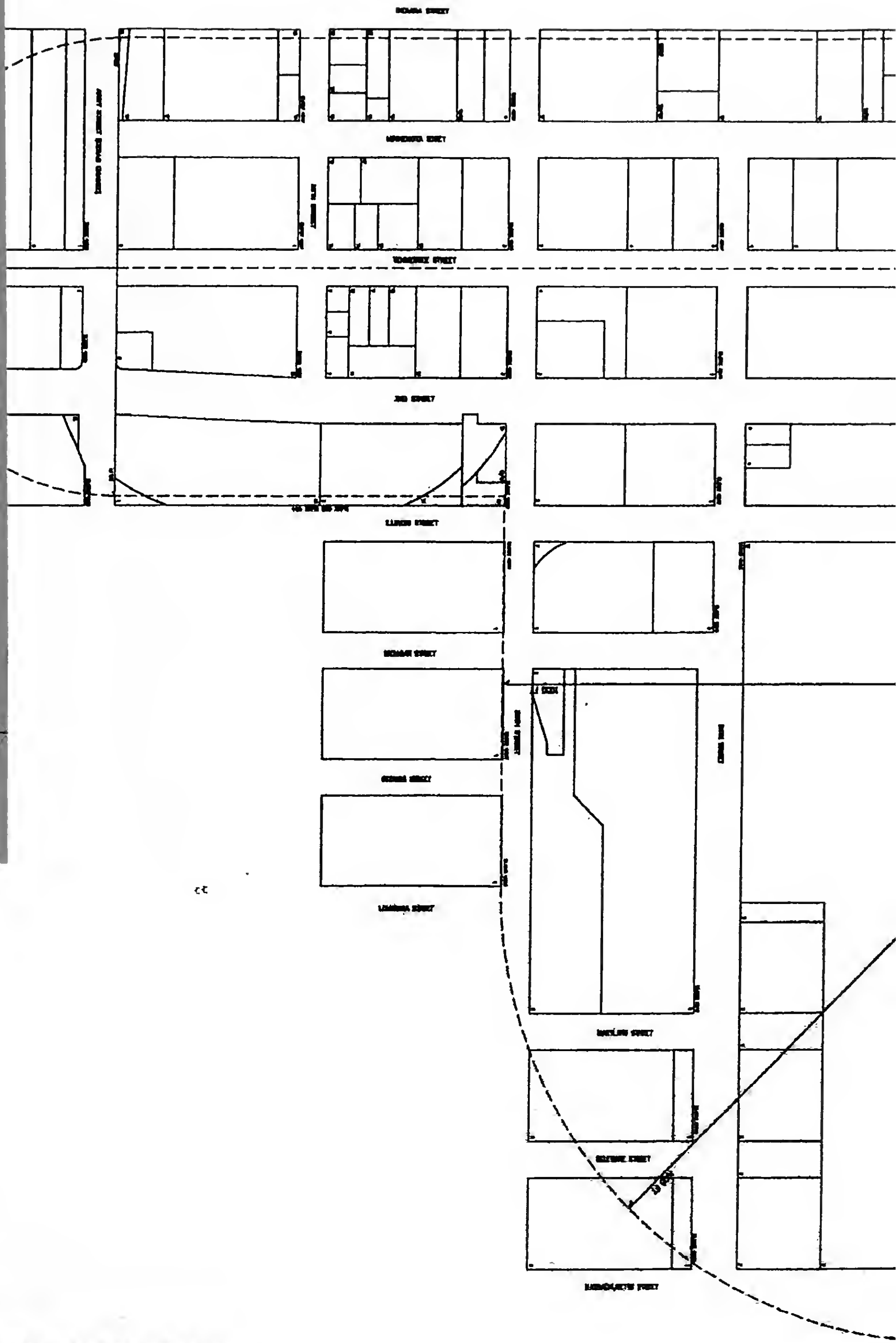

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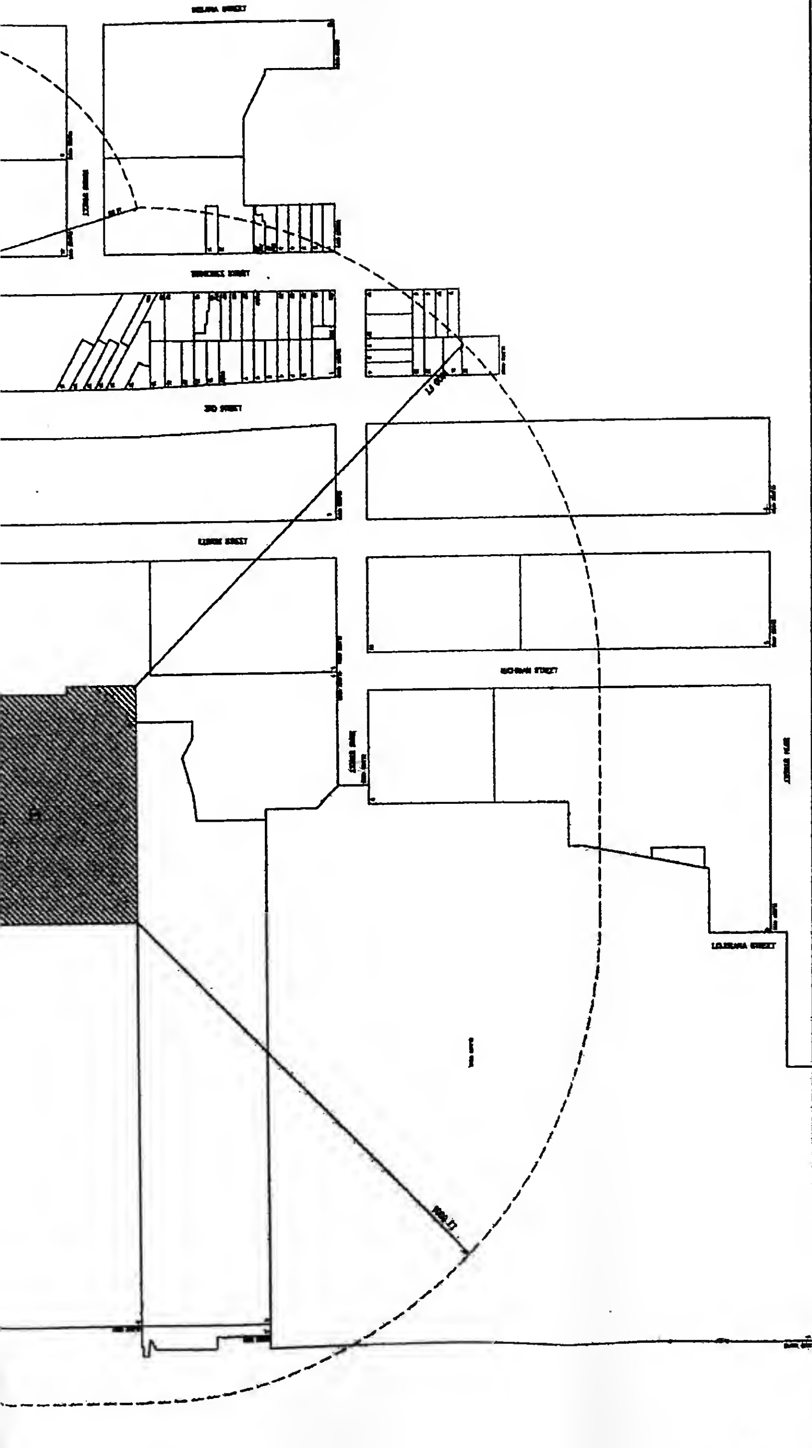

RADIUS services

445 Grant Avenue Suite 400
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San Francisco, CA

SCALE: 1"=140'-0"

[redacted]

[redacted]

JOB NO:	DATE: 040219
41750000	DRAWN: DC
	CHECKED: DC

AREA RADIUS MAP

[redacted]

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
0001	001	RADIUS SERVICES NO. 41750000	1201 ILLINOIS ST	CH2M	04	0219
0001	002	. . . .	. . . .	. . . . . .	.	. .
0001	003	R A D I U S S E R V I C E S	4 4 5 G R A N T A V # 4 0 0	SAN FRANCISCO	CA	94108
0001	004	C H 2 M	2485 NATOMAS PARK DR #600	SACRAMENTO	CA	94833
0001	005	. . . .	. . . .	. . . . . .	.	. .
4052	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4108	003D	BRUNO A DAVIS TRS	1308 LASUEN DR	MILLBRAE	CA	94030-2846
4108	003J	HANLEY TRUST	3765 GRASS VALLEY HWY #2	AUBURN	CA	95602-2025
4108	003L	SUREND SHARMA	27824 ORMOND AV	HAYWARD	CA	94544-5020
4108	003N	WALTER PARKS	5583 OCCIDENTAL RD	SANTA ROSA	CA	95401-5584
4108	004	DOUGLAS E GOWER ETAL	2496 3RD ST	SAN FRANCISCO	CA	94107-3111
4108	005	MARVIN LAU ETAL	432 GATEWAY DR #1	PACIFICA	CA	94044-1617
4108	006	ROBERT NOELKE	1074 TENNESSEE ST	SAN FRANCISCO	CA	94107-3016
4108	008	ROBIN HIRSH	1079 TENNESSEE ST	SAN FRANCISCO	CA	94107-3015
4108	009	WALTER PARKS	5583 OCCIDENTAL RD	SANTA ROSA	CA	95401-5584
4108	010	EMIL M MERCURI ETAL	232 CLIPPER ST	SAN FRANCISCO	CA	94114-3819
4108	011	JOHN A & BARBARA D KNOX TRUST	1483 BACON ST	SAN FRANCISCO	CA	94134-1640
4108	020	LINDA CATRON	PO BOX 10216	SAN JOSE	CA	95157-1216
4108	021	TENNESSEE ST PTNRS	1089 TENNESSEE ST	SAN FRANCISCO	CA	94107-3015
4109	001	ANGELO MARKOULIS	2345 3RD ST	SAN FRANCISCO	CA	94107-3108
4110	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4110	008A	PAC GAS & ELECTRIC CO	245 MARKET ST	SAN FRANCISCO	CA	94105
4111	004	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4120	002	PAC GAS & ELECTRIC CO	245 MARKET ST	SAN FRANCISCO	CA	94105
4170	009	HOWARD PROPERTIES	501 2ND ST #720	SAN FRANCISCO	CA	94107-4134
4170	010	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4171	001	EDWARD ELHAUGE ETAL	1100 TENNESSEE ST	SAN FRANCISCO	CA	94107-3417
4171	002	EOI TAKAGI	1102 TENNESSEE ST	SAN FRANCISCO	CA	94107-3417
4171	003	MICHAEL L EKLUND ETAL	4740 MONTGOMERY LN	SANTA ROSA	CA	95409-4218
4171	004	JEFFREY W RADER	1455 SHOTWELL ST	SAN FRANCISCO	CA	94110-5201
4171	005	DENNIS J HERRERA ETAL	1116 TENNESSEE ST	SAN FRANCISCO	CA	94107-3417
4171	011	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4171	020	HOWARD PROPERTIES	501 2ND ST #720	SAN FRANCISCO	CA	94107-4134
4171	021	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4171	025	OSA ASSOC III LLC	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4171	026	OSA ASSOC III LLC	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4171	027	OSA ASSOC III LLC	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4171	028	RAUL & DENISE ARRIAZA	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4171	029	RAUL & DENISE ARRIAZA	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4171	030	RAUL & DENISE ARRIAZA	4248 23RD ST	SAN FRANCISCO	CA	94114-3139
4172	001	BALDINI TRUST	4977 MISSION ST	SAN FRANCISCO	CA	94112-3415
4172	002	MARKY LYNN QUAYLE	2380 BROADWAY ST	SAN FRANCISCO	CA	94115-1234
4172	003	CHARLES A CANEPA ETAL	PO BOX 170218	SAN FRANCISCO	CA	94117-0218
4172	004	INEZ HUNTER TRUST	2524 3RD ST	SAN FRANCISCO	CA	94107-3113
4172	005	JAMES T AMOS ETAL	2530 3RD ST	SAN FRANCISCO	CA	94107-3113
4172	006	SCOT & MARIA JENERIK	2538 3RD ST	SAN FRANCISCO	CA	94107-3113
4172	007	GARY KREMEN	2542 3RD ST	SAN FRANCISCO	CA	94107-3113
4172	010	PHILIP MAKANNA ETAL	665 ARKANSAS ST	SAN FRANCISCO	CA	94107-2830
4172	014	LEO TRUST	159 SHOOTING STAR ISLE	FOSTER CITY	CA	94404-1805
4172	015	ROBERT C MACPHEE	PO BOX 411567	SAN FRANCISCO	CA	94141-1567
4172	016	THOMAS LUNDBERG ETAL	237 ROSE AV	MILL VALLEY	CA	94941-5033

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4172	018	RAUL VILLASENOR	2624 3RD ST	SAN FRANCISCO	CA	94107-3115
4172	018A	TERRYL TAGG ETAL	1195 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	019	ROBERT NOELKE	1074 TENNESSEE ST	SAN FRANCISCO	CA	94107-3016
4172	020	MERCEDES S GARDNER TRUST	2638 3RD ST	SAN FRANCISCO	CA	94107-3115
4172	021	ANNE K MILLER TRS	735 HILLCREST WAY	REDWOOD CITY	CA	94062-3453
4172	022	FLYERS LLC	2349 RICKENBACKER WAY	AUBURN	CA	95602-9537
4172	025	THOMAS LUNDBERG ETAL	237 ROSE AV	MILL VALLEY	CA	94941-5033
4172	027	JESUS J NEVAREZ ETAL	1175 ALEMANY BL	SAN FRANCISCO	CA	94112-1401
4172	028	VIRGIE L WINCHESTER	1133 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	029	CHRISTOPHER H IRION ETAL	1129 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	032	HENRY BARGERT	1117 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	034	STEVE WELCH ETAL	19031 CARLTON AV	CASTRO VALLEY	CA	94546-2911
4172	034A	BALDINI TRUST	4977 MISSION ST	SAN FRANCISCO	CA	94112-3415
4172	034B	DOUGLAS E GOWER ETAL	1125 DE HARO ST	SAN FRANCISCO	CA	94107-3210
4172	035	RUDOLPH CHURKA ETAL	686 PARIS ST	SAN FRANCISCO	CA	94112-3512
4172	036	JASON G W FONG ETAL	1109 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	038	2572-80 THIRD ST LLC	742 4TH AV	SAN FRANCISCO	CA	94118-3913
4172	039	2572-80 THIRD ST LLC	742 4TH AV	SAN FRANCISCO	CA	94118-3913
4172	041	REDLAND GROUP INC	1155 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	044	REDLAND GROUP INC	1155 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	045	REDLAND GROUP INC	1155 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	046	REDLAND GROUP INC	1155 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	047	PETER A FURST ETAL	1121 TENNESSEE ST #1	SAN FRANCISCO	CA	94107-3454
4172	048	FRANCISCO R GUERRA	1121 TENNESSEE ST #2	SAN FRANCISCO	CA	94107-3454
4172	049	DANIEL E KAHLER TRUST	1121 TENNESSEE ST #3	SAN FRANCISCO	CA	94107-3454
4172	050	KEVIN M MCLEOD	1121 TENNESSEE ST #4	SAN FRANCISCO	CA	94107-3454
4172	051	HANS PETER & TRIBOULEY GERBER	1121 TENNESSEE ST #5	SAN FRANCISCO	CA	94107-3454
4172	052	JATEEN PAREKH	1121 TENNESSEE ST #6	SAN FRANCISCO	CA	94107-3454
4172	053	CARROLL REGAN	1155 TENNESSEE ST	SAN FRANCISCO	CA	94107-3416
4172	054	2572-80 THIRD ST LLC	742 4TH AV	SAN FRANCISCO	CA	94118-3913
4172	055	2546 THIRD ST LLC	1254 41ST AV	SAN FRANCISCO	CA	94122-1205
4172	056	RAYMOND MILLER TRS	593 TEXAS ST	SAN FRANCISCO	CA	94107-2938
4172	057	2546 THIRD ST LLC	1254 41ST AV	SAN FRANCISCO	CA	94122-1205
4172	058	2546 THIRD ST LLC	1254 41ST AV	SAN FRANCISCO	CA	94122-1205
4172	059	2546 THIRD ST LLC	1254 41ST AV	SAN FRANCISCO	CA	94122-1205
4172	060	VINCENT TOSCANO	2546 3RD ST #5	SAN FRANCISCO	CA	94107-3185
4172	061	2546 THIRD ST LLC	1254 41ST AV	SAN FRANCISCO	CA	94122-1205
4173	001	AMERICAN CAN CO	2586 3RD ST	SAN FRANCISCO	CA	94107-3113
4174	001	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4175	002	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4175	006	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4175	007	PAC GAS & ELECTRIC CO	245 MARKET ST	SAN FRANCISCO	CA	94105
4228	010	POTRERO WAREHOUSE PRPTS LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	015	1240 MINNESOTA ST ASSOC LLC	550 TOWNSEND ST #B	SAN FRANCISCO	CA	94103-4918
4228	017	TRINITY INVESTMENTS LLC	1150 25TH ST	SAN FRANCISCO	CA	94107-3510
4228	018	LYLE SWEENEY	1099 23RD ST #1	SAN FRANCISCO	CA	94107-3470
4228	019	LONDON V EUBINAG	1099 23RD ST #2	SAN FRANCISCO	CA	94107-3470
4228	020	LEONARD T GUZMAN	203 E TAYLOR ST #1	SAN JOSE	CA	95112-5038
4228	021	NESTOR D MATTHEWS	1099 23RD ST #4	SAN FRANCISCO	CA	94107-3470
4228	022	SOSS TRUST	1099 23TH ST #5	SAN FRANCISCO	CA	94107
4228	023	PAUL A MARTSON ETAL	1099 23RD ST #6	SAN FRANCISCO	CA	94107-3470

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4228	024	DAVID W REGAN	1099 23RD ST #7	SAN FRANCISCO	CA	94107-3470
4228	025	LISA A NOVAK	1099 23RD ST #18	SAN FRANCISCO	CA	94107-3471
4228	026	MAYNARD CHEN	1099 23RD ST #9	SAN FRANCISCO	CA	94107-3470
4228	027	DYANA M KING	1099 23RD ST #10	SAN FRANCISCO	CA	94107-3470
4228	028	JONATHAN & MICHELLE LARNER	1099 23RD ST #11	SAN FRANCISCO	CA	94107-3470
4228	029	BRUCE K HUIE	1099 23RD ST #12	SAN FRANCISCO	CA	94107-3471
4228	030	RONALD A BAKER	4331 26TH ST	SAN FRANCISCO	CA	94131-1809
4228	031	RANDY L SPARKS ETAL	1099 23RD ST #15	SAN FRANCISCO	CA	94107-3469
4228	032	CYRIL MEURILLON	1099 23RD ST #16	SAN FRANCISCO	CA	94107-3471
4228	033	DAVID C ZILKA	1099 23RD ST #17	SAN FRANCISCO	CA	94107-3471
4228	034	BENTON T GIAP	1099 23RD ST #18	SAN FRANCISCO	CA	94107-3471
4228	035	CRAIG S FORREST	1640 20TH ST	SAN FRANCISCO	CA	94107-2811
4228	036	HELEN J SIMON	1099 23RD ST	SAN FRANCISCO	CA	94107-3469
4228	037	SUE L WONG TRUST	23 VIOLA ST	S SAN FRANCISCO	CA	94080-7321
4228	038	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	039	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	040	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
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4228	042	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	043	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	044	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	045	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	046	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	047	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	048	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	049	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
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4228	051	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
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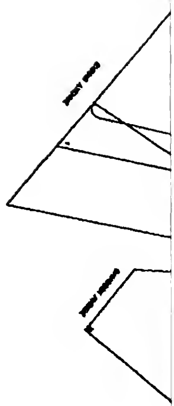
4228	053	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	054	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	055	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	056	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	057	1207 INDIANA ST ASSOC LLC	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	058	TZU LUN LIN ETAL	1011 23RD ST #1	SAN FRANCISCO	CA	94107-3472
4228	059	WILLY SIU LON NG ETAL	378 BAY RIDGE DR	DALY CITY	CA	94014-1556
4228	060	GREG ANGILLY	1011 23RD ST #3	SAN FRANCISCO	CA	94107-3472
4228	061	RONALD A BAKER	4331 26TH ST	SAN FRANCISCO	CA	94131-1809
4228	062	KIMBERLY RUTH DALE	1011 23RD ST #5	SAN FRANCISCO	CA	94107-3472
4228	063	LARRY WOLLERT	1011 23RD ST #6	SAN FRANCISCO	CA	94107-3496
4228	064	JAMES B HURLEY	1011 23RD ST #7	SAN FRANCISCO	CA	94107-3496
4228	065	MINNA LAI	1011 23RD ST	SAN FRANCISCO	CA	94107-3472
4228	066	DAVID & CHRIS STAMATION	345 GRANADA AV	SAN FRANCISCO	CA	94112-1229
4228	067	ANGUS W BARNETT	1945 WASHINGTON ST #502	SAN FRANCISCO	CA	94109-2969
4228	068	STEPHANIE BRADSHAW	1011 23RD ST #11	SAN FRANCISCO	CA	94107-3496
4228	069	DEREN J BAKER	1011 23RD ST #12	SAN FRANCISCO	CA	94107-3473
4228	070	PHILIP YAU	1011 23RD ST #21	SAN FRANCISCO	CA	94107-3475
4228	071	JOHN P TALTY	1443 16TH AV	SAN FRANCISCO	CA	94122-3509
4228	072	LARRY WARNOCK	1011 23RD ST #15	SAN FRANCISCO	CA	94107-3473
4228	073	RICK BOSTIAN	1011 23RD ST #16	SAN FRANCISCO	CA	94107-3474
4228	074	ACHIM VOERMANEK	1011 23RD ST #17	SAN FRANCISCO	CA	94107-3474

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4228	075	RANDY BOBST-MCKAY	PO BOX 372	SAN FRANCISCO	CA	94104-0372
4228	076	GENE E BURT	1011 23RD ST #19	SAN FRANCISCO	CA	94107-3474
4228	077	CHAD BURNS ETAL	1011 23RD ST #20	SAN FRANCISCO	CA	94107-3474
4228	080	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	081	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	082	KIM E BABCOCK	1325 INDIANA ST #103	SAN FRANCISCO	CA	94107-3487
4228	083	LISA K ERSKINE	1325 INDIANA ST #104	SAN FRANCISCO	CA	94107-3487
4228	084	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	085	SALVATORE BONDI	1325 INDIANA ST #106	SAN FRANCISCO	CA	94107-3487
4228	086	CHAD A COOK	1325 INDIANA ST #107	SAN FRANCISCO	CA	94107-3487
4228	087	MATTHEW W MORRIS	1325 INDIANA ST #108	SAN FRANCISCO	CA	94107-3487
4228	088	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	089	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	090	JULIO C PEIX	1325 INDIANA ST #111	SAN FRANCISCO	CA	94107-3487
4228	091	THOMAS J SHEFFLER	1325 INDIANA ST #112	SAN FRANCISCO	CA	94107-3487
4228	092	MICHAEL BURCHARDT	1325 INDIANA ST #113	SAN FRANCISCO	CA	94107-3487
4228	093	ADAM LEE	1325 INDIANA ST #114	SAN FRANCISCO	CA	94107-3491
4228	094	FIF GHOBADIAN TRUST	240 DOUGLASS ST	SAN FRANCISCO	CA	94114-2425
4228	095	HOWARD HERSH	1325 INDIANA ST #116	SAN FRANCISCO	CA	94107-3491
4228	096	ROHAN NADARAJAH	1325 INDIANA ST #201	SAN FRANCISCO	CA	94107-3488
4228	097	DON L SADLER ETAL	1325 INDIANA ST #202	SAN FRANCISCO	CA	94107-3488
4228	098	RYAN W KAUTZMAN	1325 INDIANA ST #203	SAN FRANCISCO	CA	94107-3488
4228	099	CHRISTIAN E BOHM	1325 INDIANA ST #204	SAN FRANCISCO	CA	94107-3488
4228	100	NANCY LEE	1325 INDIANA ST #205	SAN FRANCISCO	CA	94107-3488
4228	101	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	102	AIMEE H WILLIAMS	1325 INDIANA ST #207	SAN FRANCISCO	CA	94107-3488
4228	103	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	104	KEITH M SPEERS	1325 INDIANA ST #209	SAN FRANCISCO	CA	94107-3488
4228	105	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	106	SHANNON KEATON	1325 INDIANA ST #211	SAN FRANCISCO	CA	94107-3492
4228	107	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	108	MARGARET HEALY	1325 INDIANA ST #213	SAN FRANCISCO	CA	94107-3492
4228	109	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	110	DARYL EIFLER	1325 INDIANA ST #101	SAN FRANCISCO	CA	94107-3487
4228	111	REZA GHOBADIAN	1325 INDIANA ST #216	SAN FRANCISCO	CA	94107-3492
4228	112	VISNU T PITIYANUVATH	1325 INDIANA ST #301	SAN FRANCISCO	CA	94107-3493
4228	113	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	114	JULIE M HAND	1325 INDIANA ST #303	SAN FRANCISCO	CA	94107-3493
4228	115	ANGELA C SILVY	1325 INDIANA ST #304	SAN FRANCISCO	CA	94107-3493
4228	116	LAURA MACKENZIE	1325 INDIANA ST #305	SAN FRANCISCO	CA	94107-3493
4228	117	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	118	KENNETH G FRENCH ETAL	1325 INDIANA ST #307	SAN FRANCISCO	CA	94107-3493
4228	119	WILLIAM SLATKIN	1325 INDIANA ST #308	SAN FRANCISCO	CA	94107-3494
4228	120	NATALIE C MEDVED	1325 INDIANA ST #309	SAN FRANCISCO	CA	94107-3494
4228	121	EDWARD W NYQUIST	1325 INDIANA ST #310	SAN FRANCISCO	CA	94107
4228	122	INDIANA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	123	PATRICIA B ALLEN TRUST	1325 INDIANA ST #312	SAN FRANCISCO	CA	94107-3494
4228	124	MURAT M ALPER	1325 INDIANA ST #313	SAN FRANCISCO	CA	94107-3494
4228	125	MARYAM EBRAHIMI	1325 INDIANA ST #314	SAN FRANCISCO	CA	94107-3494
4228	126	SEAN SMITH	1325 INDIANA ST #101	SAN FRANCISCO	CA	94107-3487
4228	127	LORIE LOE	1325 INDIANA ST #316	SAN FRANCISCO	CA	94107-3494

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4228	128	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	129	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	130	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	131	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	132	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	133	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	134	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	135	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	136	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	137	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	138	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	139	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	140	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	141	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	142	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	143	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	144	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	145	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	146	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	147	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	148	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	149	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	150	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	151	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	152	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	153	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	154	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	155	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	156	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4228	157	MINNESOTA LIVE & WORK ASSOC LLC	600 18TH ST	SAN FRANCISCO	CA	94107-3037
4229	002	FULLER PROPERTIES LLC	10610 WIMBLEDON ST	RANCHO MIRAGE	CA	92270-1471
4229	003	MARGARET ROCCHIA TRUST	1237 MINNESOTA ST	SAN FRANCISCO	CA	94107-3407
4229	004	FULLER PROPERTIES LLC	10610 WIMBLEDON ST	RANCHO MIRAGE	CA	92270-1471
4230	001	RYDER TRUCK RENTAL INC	PO BOX 25719	MIAMI	FL	33102-5719
4231	002	ROBERT & CARMEN A DELANO TRS	35 EVERGREEN CT	MILLBRAE	CA	94030-1520
4231	004	PARK TRUST	1820 SWEETWOOD DR	DALY CITY	CA	94015-2013
4231	005	LIDO MARTOCCHIO	3759 MISSION ST	SAN FRANCISCO	CA	94110-5844
4232	001	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4232	003	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4232	004	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4232	005	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4232	006	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4232	007	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4232	008	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4232	009	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4232	010	HARRIGAN WEIDENMULLER CO	300 MONTGOMERY ST #800	SAN FRANCISCO	CA	94104-1910
4239	001	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4239	002	CITY & COUNTY OF S F	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102-6051
4240	001	MIRANT POTRERO LLC	1201A ILLINOIS ST	SAN FRANCISCO	CA	94107
4240	002	CITY & COUNTY OF S F	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102-6051
4241	002	MARY BATTAINI	PO BOX 77004	SAN FRANCISCO	CA	94107-0004

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4241	003	MARY BATTAINI	PO BOX 77004	SAN FRANCISCO	CA	94107-0004
4241	004	SHEEDY INC	PO BOX 77004	SAN FRANCISCO	CA	94107-0004
4244	002	MARY BATTAINI	1401 GRIFFITH ST	SAN FRANCISCO	CA	94124-3400
4244	003	SHEEDY INC	PO BOX 77004	SAN FRANCISCO	CA	94107-0004
4244	004	SHEEDY INC	PO BOX 77004	SAN FRANCISCO	CA	94107-0004
4245	001	2833 THIRD ST LLC	2833 3RD ST	SAN FRANCISCO	CA	94107-3501
4245	002	JOYCE M FOLEY ETAL	26079 TABLE MEADOW RD	AUBURN	CA	95602-8958
4246	001	JOHN ANTHONY TEDESCO	2800 3RD ST	SAN FRANCISCO	CA	94107-3502
4246	003	EQUILON ENTERPRISES LLC	PO BOX 4369	HOUSTON	TX	77210-4369
4246	004	MARY H LAWSON	1495 TENNESSEE ST	SAN FRANCISCO	CA	94107-3420
4247	002	RICHARD P GENTSCHEL ETAL	115 LOCHINVAR RD	SAN RAFAEL	CA	94901-2423
4247	003	GLENN MCNULTY ETAL	1400 TENNESSEE ST	SAN FRANCISCO	CA	94107-3421
4247	004	SATORU HOSODA ETAL	1444 TENNESSEE ST	SAN FRANCISCO	CA	94107-3421
4293	006	HERMCO INC	1850 RALSTON AV	HILLSBOROUGH	CA	94010-6455
4293	012	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	013	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	014	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	015	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	016	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	018	HELEN BERLINER	2190 WASHINGTON ST	SAN FRANCISCO	CA	94109-2869
4293	019	TEDESCO TRUST	1450 PURISSIMA CREEK RD	HALF MOON BAY	CA	94019-2589
4293	020	LUTHER L KNOX	1415 INDIANA ST #102	SAN FRANCISCO	CA	94107-3536
4293	021	TEDESCO TRUST	1450 PURISSIMA CREEK RD	HALF MOON BAY	CA	94019-2589
4293	022	JAMES B HURLEY	1193 CHURCH ST	SAN FRANCISCO	CA	94114-3403
4293	023	TEDESCO TRUST	1450 PURISSIMA CREEK RD	HALF MOON BAY	CA	94019-2589
4293	024	CATHERINE T DOYLE	1415 INDIANA ST #106	SAN FRANCISCO	CA	94107-3536
4293	025	DRAWDY TRUST	16 FARM RD	SAN RAFAEL	CA	94903-3824
4293	026	LISA M FAZENDIN	1415 INDIANA ST #202	SAN FRANCISCO	CA	94107-3536
4293	027	DIANNE LEE WITHELDER TRUST	227 ROMAIN ST	SAN FRANCISCO	CA	94131-1341
4293	028	BRIAN J RODRIGUES	1220 EDGEWOOD RD	REDWOOD CITY	CA	94062-2729
4293	029	TEDESCO TRUST	1450 PURISSIMA CREEK RD	HALF MOON BAY	CA	94019-2589
4293	030	NATHAN ZAIDENWEBER	1415 INDIANA ST #206	SAN FRANCISCO	CA	94107-3537
4293	031	CHARLES GEBHARD	1415 INDIANA ST #301	SAN FRANCISCO	CA	94107-3537
4293	032	GEORGE F DEMAREST	PO BOX 536	BELMONT	CA	94002-0536
4293	033	BRIAN J RODRIGUES	1220 EDGEWOOD RD	REDWOOD CITY	CA	94062-2729
4293	034	ROBERT ROY GARCIA	411 VERMONT ST	SAN FRANCISCO	CA	94107-2325
4293	035	NOAH BERLAND	1816 5TH ST	BERKELEY	CA	94710-1915
4293	036	PHILIP M FREDERICO	1415 INDIANA ST #306	SAN FRANCISCO	CA	94106-0001
4294	003	IVY JERRY TRS	450 FERGUSON DR	MOUNTAIN VIEW	CA	94043-5214
4294	012	MICHAEL D GRENIER	1500 TENNESSEE ST	SAN FRANCISCO	CA	94107-3524
4294	013	TAN TRS	1331 31ST AV	SAN FRANCISCO	CA	94122-1419
4294	014	TAN TRS	1331 31ST AV	SAN FRANCISCO	CA	94122-1419
4294	015	TAN TRS	1331 31ST AV	SAN FRANCISCO	CA	94122-1419
4294	016	FRED S & NANCY PANG	1425 MINNESOTA ST	SAN FRANCISCO	CA	94107-3519
4294	017	IVY JERRY TRS	450 FERGUSON DR	MOUNTAIN VIEW	CA	94043-5214
4295	003	IVY JERRY TRS	450 FERGUSON DR	MOUNTAIN VIEW	CA	94043-5214
4295	007	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	008	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	009	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	010	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	011	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4295	013	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	014	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4295	015	BIC 3RD ST INC	2990 3RD ST	SAN FRANCISCO	CA	94107-3504
4296	005	JOSEPHINE DENTONI INC	2820 SUMMIT DR	BURLINGAME	CA	94010-6239
4296	010	JOSEPHINE DENTONI INC	2820 SUMMIT DR	BURLINGAME	CA	94010-6239
4296	013	BRENT K ZERULL TRUST	222 SEA VIEW DR	SAN RAFAEL	CA	94901-2352
4296	015	JERRY R BARRISH	315 SHORESIDE DR	PACIFICA	CA	94044-3900
4296	016	ECKSTROM BOWLES ETAL	2290 S 10TH ST	SAN JOSE	CA	95112-4114
4296	017	JERRY BARRISH	315 SHORESIDE DR	PACIFICA	CA	94044-3900
4297	001	CITY & COUNTY OF S F	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102-6051
4298	001	CITY & COUNTY OF S F	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102-6051
4299	001	CITY & COUNTY OF S F	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102-6051
4314	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4314	001A	SIXTEEN FIRST ST INC	572 RUGER ST #A	SAN FRANCISCO	CA	94129
4315	008	WILLIAM D SPENCER ETAL	99 S HILL DR	BRISBANE	CA	94005-1215
4315	013	WILLIAM D SPENCER ETAL	99 S HILL DR	BRISBANE	CA	94005-1215
4316	001	TENNESSEE PROPERTIES LLC	3320 JACKSON ST	SAN FRANCISCO	CA	94118-2019
4316	002	WOCO INC	157 7TH AV	SAN FRANCISCO	CA	94118-1206
4317	012	PAOLO & ERIN COSTA	18 APOLLO RD	BEL TIBURON	CA	94920-1302
4317	014	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4317	015	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4317	017	STEINER CORP	505 E S TEMPLE	SALT LAKE CITY	UT	84102-1004
4317	018	STEINER CORP	505 E S TEMPLE	SALT LAKE CITY	UT	84102-1004
4353	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4353	008	YANGS PROPERTIED LLC	619 35TH AV	SAN FRANCISCO	CA	94121-2709
4353	009	JIM J H LUO ETAL	2379 FUNSTON AV	SAN FRANCISCO	CA	94116-1948
4355	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4355	006	GAEHWILER TRUST	1550 MICHIGAN ST	SAN FRANCISCO	CA	94124-1233
4356	001	WILLIAM D SPENCER ETAL	99 S HILL DR	BRISBANE	CA	94005-1215
4356	001A	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
9999	999	. . . .	. . . .	. . . . . .	.	. .



The information contained herein has been obtained from sources that we deemed reliable and correct at the time of preparation. We have no reason to doubt its accuracy but we do not guarantee it.

R A D I U S

445 Grant Avenue Suite 400
San Francisco, CA 94108-3208
(415) 391-4775

CONTINUATION...
BLOCK 4175
LOT 6

San Francisco, CA

N

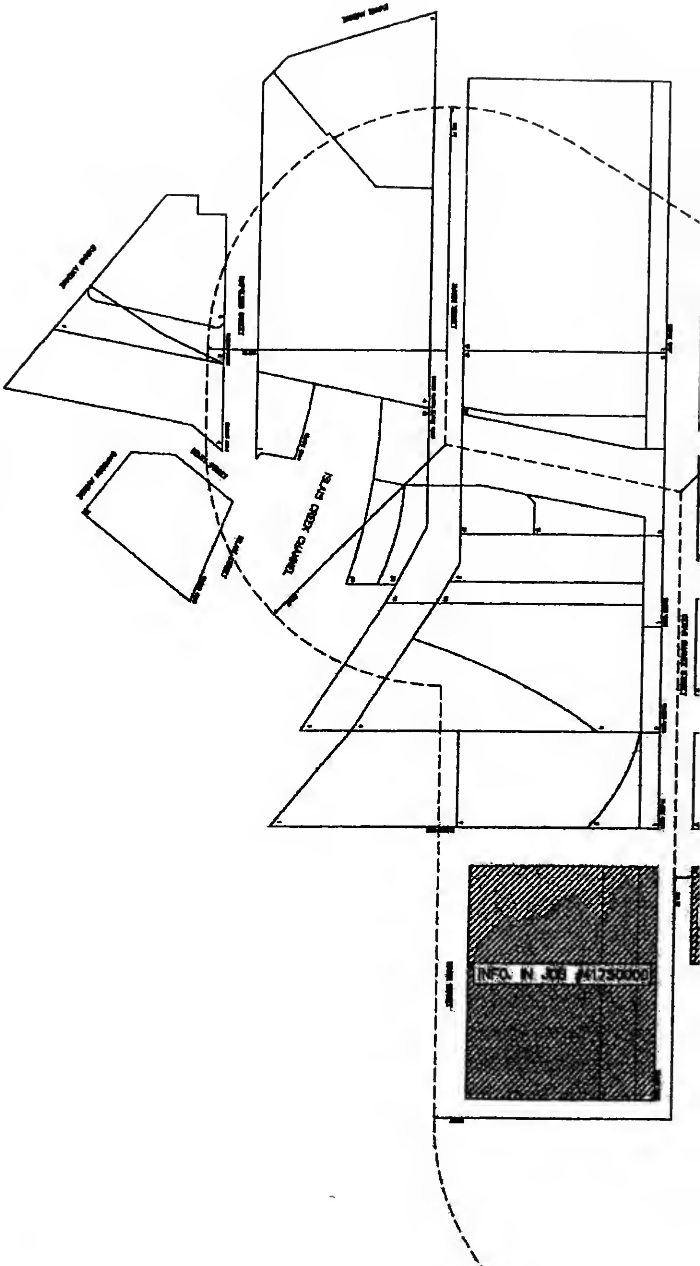
SCALE: 1"=140'-0"

[redacted]

[redacted]

JOB NO:	DATE: 040225
4175000A	DRAWN: DC
	CHECKED: DC

AREA RADIUS
MAP



The information contained herein has been obtained from sources that we deemed reliable and current at the time of preparation. We have no reason to doubt its accuracy but we do not guarantee it.

RADIUS

445 Grant Avenue Suite 400
San Francisco, CA 94108-3206
(415) 391-4775

CONTINUATION...
BLOCK 4175
LOT 6

San Francisco, CA

SCALE: 1"=140'-0"

[redacted]

[redacted]

JOB NO:	DATE: 040226
4175000A	DRAWN: DC
	CHECKED: DC

AREA RADIUS MAP

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
0001	001	RADIUS SERVICES NO. 4175000A	1201 ILLINOIS ST	CH2M	04	0225
0001	002	. . . .	. . . .	. . . . . .	.	. .
0001	003	RADIUS SERVICES	445 GRANT AV #400	SAN FRANCISCO	CA	94108
0001	004	CH2M	2485 NATOMAS PARK DR #600	SACRAMENTO	CA	94833
0001	005	. . . .	. . . .	. . . . . .	.	. .
4288	003	YELLOW CAB COOPERATIVE INC	1200 MISSISSIPPI ST	SAN FRANCISCO	CA	94107-3436
4288	004	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4288	005	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4288	006	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4290	008	JAFFE TRUST	1500 OAK RIM DR	HILLSBOROUGH	CA	94010-7365
4290	010	DENNIS C MAGRI	148 MARIETTA DR	SAN FRANCISCO	CA	94127-1842
4290	011	PATRICK & WENDY MCCANN	3125 CANYON RD	BURLINGAME	CA	94010-6020
4290	012	DENNIS C MAGRI	148 MARIETTA DR	SAN FRANCISCO	CA	94127-1842
4290	014	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4290	018	PENINSULA CORRIDOR JOINT POWER	1110 PENNSYLVANIA AV	SAN FRANCISCO	CA	94107
4291	017	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4291	018	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4318	011	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	012	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	015	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	017	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4318	018	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4318	022	ANJANETTE Y PONG	1568 INDIANA ST #1	SAN FRANCISCO	CA	94107-3534
4318	023	PAUL WILKENS	1568 INDIANA ST #2	SAN FRANCISCO	CA	94107-3534
4318	024	CHI KIM YOUNG	1568 INDIANA ST #3	SAN FRANCISCO	CA	94107-3534
4318	025	RANDY CORDEIRO	1568 INDIANA ST #4	SAN FRANCISCO	CA	94107-3534
4318	026	JANSEN CHIU	1568 INDIANA ST #5	SAN FRANCISCO	CA	94107-3534
4318	027	DEBORAH A DEVITA	1568 INDIANA ST #6	SAN FRANCISCO	CA	94107-3534
4318	028	JAMES COHILL	1568 INDIANA ST #7	SAN FRANCISCO	CA	94107-3534
4318	029	GORDON C LYON	1568 INDIANA ST #8	SAN FRANCISCO	CA	94107-3534
4318	030	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	031	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	032	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	033	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	034	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	035	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	036	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	037	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	038	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	039	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	040	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	041	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	042	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	043	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	044	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	045	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	046	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	047	DANIEL NORMANDIN	1578 INDIANA ST #6	SAN FRANCISCO	CA	94107-3543
4318	048	FARBOD BARSUM	1578 INDIANA ST #7	SAN FRANCISCO	CA	94107-3543
4318	049	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	050	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
0001	001	RADIUS SERVICES NO. 4175000A	1201 ILLINOIS ST	CH2M	04	0225
0001	002	. . . .	. . . .	. . . . . .	.	. .
0001	003	R A D I U S S E R V I C E S	4 4 5 G R A N T A V # 4 0 0	SAN FRANCISCO	CA	94108
0001	004	C H 2 M	2485 NATOMAS PARK DR #600	SACRAMENTO	CA	94833
0001	005	. . . .	. . . .	. . . . . .	.	. .
4288	003	YELLOW CAB COOPERATIVE INC	1200 MISSISSIPPI ST	SAN FRANCISCO	CA	94107-3436
4288	004	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4288	005	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4288	006	BAY WEST FALASCHI-COX #1	2 HENRY ADAMS ST #450	SAN FRANCISCO	CA	94103-5000
4290	008	JAFFE TRUST	1500 OAK RIM DR	HILLSBOROUGH	CA	94010-7365
4290	010	DENNIS C MAGRI	148 MARIETTA DR	SAN FRANCISCO	CA	94127-1842
4290	011	PATRICK & WENDY MCCANN	3125 CANYON RD	BURLINGAME	CA	94010-6020
4290	012	DENNIS C MAGRI	148 MARIETTA DR	SAN FRANCISCO	CA	94127-1842
4290	014	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4290	018	PENINSULA CORRIDOR JOINT POWER	1110 PENNSYLVANIA AV	SAN FRANCISCO	CA	94107
4291	017	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4291	018	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4318	011	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	012	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	015	MITCHELL & MICHAEL PROPERTIES	1580 INDIANA ST	SAN FRANCISCO	CA	94107-3517
4318	017	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4318	018	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4318	022	ANJANETTE Y PONG	1568 INDIANA ST #1	SAN FRANCISCO	CA	94107-3534
4318	023	PAUL WILKENS	1568 INDIANA ST #2	SAN FRANCISCO	CA	94107-3534
4318	024	CHI KIM YOUNG	1568 INDIANA ST #3	SAN FRANCISCO	CA	94107-3534
4318	025	RANDY CORDEIRO	1568 INDIANA ST #4	SAN FRANCISCO	CA	94107-3534
4318	026	JANSEN CHIU	1568 INDIANA ST #5	SAN FRANCISCO	CA	94107-3534
4318	027	DEBORAH A DEVITA	1568 INDIANA ST #6	SAN FRANCISCO	CA	94107-3534
4318	028	JAMES COHILL	1568 INDIANA ST #7	SAN FRANCISCO	CA	94107-3534
4318	029	GORDON C LYON	1568 INDIANA ST #8	SAN FRANCISCO	CA	94107-3534
4318	030	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	031	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	032	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	033	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	034	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	035	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	036	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	037	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	038	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	039	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	040	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	041	1588 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	042	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	043	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	044	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	045	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	046	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	047	DANIEL NORMANDIN	1578 INDIANA ST #6	SAN FRANCISCO	CA	94107-3543
4318	048	FARBOD BARSUM	1578 INDIANA ST #7	SAN FRANCISCO	CA	94107-3543
4318	049	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	050	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401

BLOCK	LOT	OWNER	OADDR	CITY	STATE	ZIP
4318	051	1578 INDIANA CORP	133 FLYING MIST ISLE	FOSTER CITY	CA	94404-1401
4318	052	MICHAEL J GRACE	1578 INDIANA ST #11	SAN FRANCISCO	CA	94107-3544
4318	053	JUSTIN A LEWIS ETAL	1578 INDIANA ST #12	SAN FRANCISCO	CA	94107-3544
4347	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4347	010	HEARST CORP	1901 CESAR CHAVEZ	SAN FRANCISCO	CA	94124-1133
4347A	003	SHURARGD STORAGE CENTERS INC	1155 VALLEY ST #400	SEATTLE	WA	98109-4426
4347A	004	M-O SAN FRANCISCO LP	380 STEVENS AV #313	SOLANA BEACH	CA	92075-2069
4347B	004	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4347B	006	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4347B	007	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4349	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4349	002	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4349	002A	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4349	003A	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4349	003B	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4349	004	SOUTHERN PAC TRANSPORTATION CO	1475 CESAR CHAVEZ	SAN FRANCISCO	CA	94124-1100
4349	004A	SOUTHERN PAC TRANSPORTATION CO	1475 CESAR CHAVEZ	SAN FRANCISCO	CA	94124-1100
4349	011	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4349	012	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4349	013	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4349	014	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4349	015	FEDERATED METALS CORP	1160 STATE ST	PERTH AMBOY	NJ	08861-2048
4349	016	HEARST CORP	227 W TRADE ST	CHARLOTTE	NC	28202-1675
4352	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4352	006	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4352	007	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4381	001	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4382	003	CALTRANS	111 GRAND AV	OAKLAND	CA	94612
4382	004	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4382	005	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
4382	006	SF REAL ESTATE DEPT	25 VAN NESS AV #400	SAN FRANCISCO	CA	94102
5214	001	SOUTHERN PAC TRANSPORTATION CO	1475 CESAR CHAVEZ	SAN FRANCISCO	CA	94124-1100
5214	004	SOUTHERN PAC TRANSPORTATION CO	1475 CESAR CHAVEZ	SAN FRANCISCO	CA	94124-1100
5215	021	MURRAY G COLE	1650 DAVIDSON AV	SAN FRANCISCO	CA	94124-1143
9999	999	. . . .	. . . .	. . . . . .	.	. .

APPENDIX 1B

Persons Who Prepared the AFC

APPENDIX 1B

Persons Who Prepared the AFC

Section	Title	Preparer	Company
	Applicant Project Manager	Ralph Hollenbacher	San Francisco Public Utilities Commission (SFPUC)
	CH2M HILL Project Manager	John Carrier	CH2M HILL
	Environmental Project Manager	Steve De Young	De Young Environmental Consulting
1.0	Executive Summary	John Carrier	CH2M HILL
2.0	Project Description	Steve Brock/Jerry Salamy	PB Power / CH2M HILL
3.0	Purpose and Need	Barry Flynn/Ed Smeloff	Flynn Resource Consultants Inc./SFPUC
4.0	Environmental Justice	Anne Eng	City of San Francisco
5.0	Electric Transmission	Steve Brock	PB Power
6.0	Natural Gas Supply	Steve Brock	PB Power
7.0	Water Supply	Matt Franck	CH2M HILL
8.0	Environmental Information		
8.1	Air Quality	Gary Rubenstein/ Nancy Matthews	Sierra Research
8.2	Biological Resources	John Cleckler/Debra Crowe	CH2M HILL
8.3	Cultural Resources	James Bard	CH2M HILL
8.4	Land Use	Steven Smith	CH2M HILL
8.5	Noise	Mark Bastasch	CH2M HILL
8.6	Public Health	John Lowe	CH2M HILL
8.7	Worker Safety	Trish Danby	CH2M HILL
8.8	Socioeconomics	Fatuma Yusuf/John Carrier	CH2M HILL
8.9	Agriculture and Soils	Steve Long	CH2M HILL
8.10	Traffic and Transportation	Dennis Pascua	CH2M HILL
8.11	Visual Resources	Wendy Haydon	CH2M HILL
8.12	Hazardous Material Handling	Mary McDonald/Karen Parker	Orion Environmental /CH2M HILL
8.13	Waste Management	Mary McDonald/Karen Parker	Orion Environmental/ CH2M HILL
8.14	Water Resources	Joyce Hsiao/Matt Franck	Orion Environmental/ CH2M HILL
8.15	Geologic Hazards and Resources	Tom Lae	CH2M HILL
8.16	Paleontological Resources	Lanny Fisk	PaleoResource Consultants
9.0	Alternatives	Jerry Salamy	CH2M HILL
10.0	Engineering	Steve Brock	PB Power

APPENDIX 5

System Impact Study

APPENDIX 5

System Impact Study

Five hard copies of Appendix 5, System Impact Study, Study Plan, prepared by Pacific Gas and Electric Company, were submitted to the California Energy Commission. Electronic copies will be provided upon request.

APPENDIX 6

Interconnection Agreement Letter from PG&E

Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94105
Mailing Address
Mail Code B16A
P.O. Box 770000
San Francisco, CA 94177
415/973-7000

PG&E

<u>Via Mail and Fax</u>

February 10, 2004

Mr. Ralph Hollenbacher
Hetch Hetchy Water & Power
1155 Market Street, 4th Floor
San Francisco, CA 94103

Subject: San Francisco PUC Hetch Hetchy DWP, San Francisco Energy Reliability Project

Dear Mr. Hollenbacher:

Pursuant to the Hetch Hetchy Department of Water and Power's (Applicant) request, Pacific Gas & Electric Company (PG&E) provides Applicant with a response to its Preliminary Application for Gas Service for a proposed San Francisco Energy Reliability Project (Facility) to be located near 23rd Street and Illinois Street, San Francisco, California. This review is based upon a request for gas service of July 9, 2005, for a gas load of 1860 MMBTU/Hr year round at an elevated service delivery pressure of 675 psig.

PG&E views this project as speculative, and any changes to Applicant's proposed volumetric needs, or to the demand on PG&E's system, could result in modifications to information PG&E provides herein. At no time does PG&E guarantee pressures above that which is specified in Gas Rule 2 (7-inches water column). The pressures provided herein are based on computer models, which contain various assumptions and uncertainties, and therefore represent our best estimate of expected pressures.

This project assumes that Hunters Point is off line, and that Mirant Potrero Power Plant is on line with expanded new load.

Standard Facilities:

PG&E proposes to tap it's Line 109 approximately 25 feet west of the meter set and install 6-inch steel pipeline to a new 12" Ultrasonic Meter. PG&E estimates this design can provide Applicant with between 80 and 107 psig as measured immediately downstream of the meter set.

Ralph Hollenbacher
February 10, 2004
Page 2

Special Facilities:

In order to provide Applicant with possible higher gas service reliability, PG&E proposes to tap the gas header located at it's San Francisco Load Center and run approximately 275 feet of 8-inch service line to the new meter set. PG&E estimates that Applicant would see approximately 74 to 102 psig downstream of the meter set with this configuration. This additional reliability would be provided because the header is served by three PG&E gas pipelines; Line 101, Line 109 and Line 132. The Line 109 tap would be between PG&E's block valve at the San Francisco Load Center and the next valve approximately 4,500 feet downstream. A shut down on this section of Line 109 may result in interruption of gas service. If the service line is tapped into the header, service can be provided from the three gas lines.

Costs:

PG&E's estimated Applicant order-of-magnitude cost, plus-or-minus 50 percent follows.

Total Estimated Applicant Cost for Standard Facilities Design at Prevailing Service Delivery Pressure	**Costs +/- 50%**
1. Install tap and 6-inch pipe from Line 109 system to meter set	$50,000
3. Install 12-inch ultrasonic meter	$380,000
4. Sub Total:	$430,000
5. Income Tax Contribution of Construction (22% of 3.)	$95,000
6. Total Applicant Standard Facility Design Cost	$525,000

Total Estimated Applicant Cost for Special Facilities Design at Elevated Service Delivery Pressure	**Costs +/- 50%**
1. Incremental cost for 275 feet of 8-inch steel pipeline	$100,000
2. Income Tax Contribution of Construction (22% of 1.)	$22,000
3. Cost of Ownership – Customer-Financed Equivalent One-Time Payment Option	$77,000
4. Total Applicant Special Facilities Design Cost	$199,000
5. Total Applicant Cost – Standard plus Special Facilities Design	$724,000

Costs do not include allowances, if any. Special Facilities costs and service will be in accordance with PG&E Gas Rule 2. Additionally, the identified ITCC rate of 22% is a temporary figure, only in effect through December 2004. In 2005, the rate will revert to the previous figure of 35%.

PG&E

Next Steps:

Applicant should submit to PG&E a request for Formal Application for Gas Service, which would include the following:

- A cover letter requesting PG&E proceed with the gas service connection under a Formal Application for Gas Service;
- An election of the Standard or Special Facilities Design;
- A site map of the proposed meter set location;
- Updated Cogen/Power Plant Interconnection Sheet;
- Load curve for hourly/daily projected loads both when online and during startup testing;
- The estimated annual gas usage of the proposed Facility;
- Two executed originals of the attached "Agreement to Perform Tariff Schedule Related Work; and
- A cash advance of $45,000 to initiate engineering.

The cash advance is to initiate the engineering required to develop the project to a point where PG&E can proceed with construction, and does not include ordering long lead-time material. The final costs and work schedule for this phase will be determined as PG&E proceeds with detailed engineering and land work. Currently Applicant has approximately $9,000 in unspent cash advance funds. The work initiated by this cash advance is outlined on the attached Agreement to Perform Tariff Schedule Related Work.

Please forward the cash advance and information requested to:

Pacific Gas and Electric Company
Attn: Rod Boschee
Mail Code: B16A
P.O. Box 770000
San Francisco, CA 94177

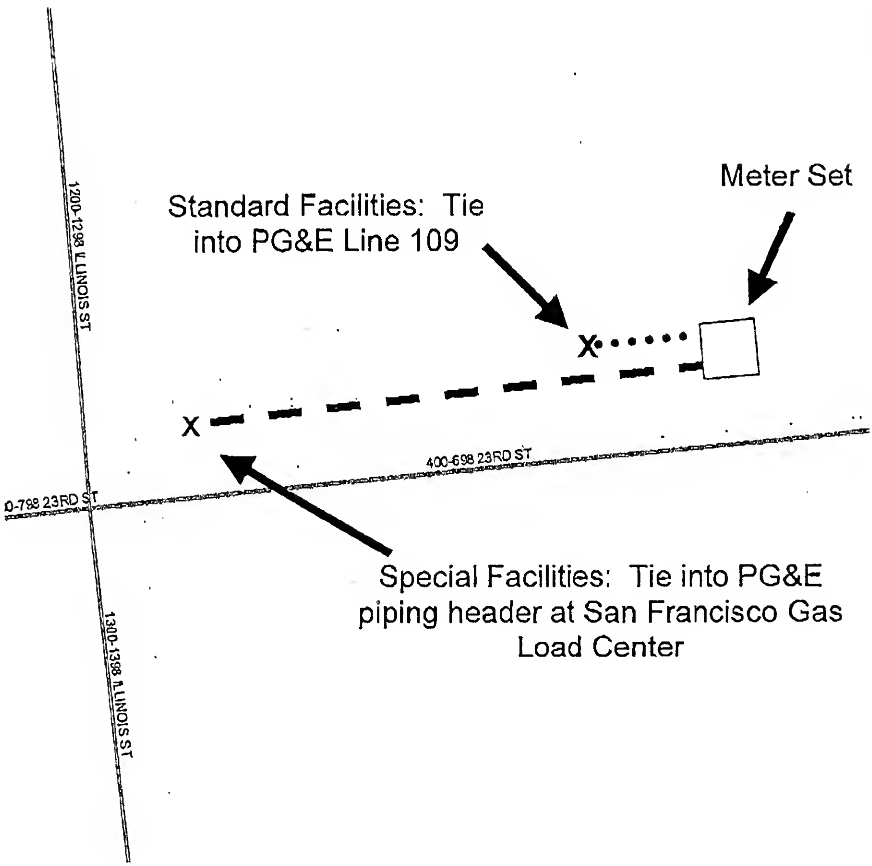
Please contact Mike O'Brien at 415-973-5652 with questions you may have.

Sincerely,

Rod Boschee | MDO

Rodney A. Boschee
Manager, Contract Development and Management

San Francisco Energy Reliability Project



PG&E
Pacific Gas and Electric Company

Agreement to Perform Tariff Schedule Related Work

DISTRIBUTION: ☒ APPLICANT (Original) ☒ DIVISION (Original) ☐ ACCTG. SVCS.

REFERENCE: SF PUC Hetch Hetchy DWP; CGT - GSO - GSM&TS

San Francisco PUC Hetch Hetchy Department of Water and Power (Applicant) has requested PACIFIC GAS AND ELECTRIC COMPANY, a California corporation (PG&E), to perform the tariff schedule related work as located and described in paragraph 3 herein.

PG&E agrees to perform the requested work and furnish all necessary labor, equipment, materials and related facilities required therefor, subject to the following conditions:

1. Whenever part or all of the requested work is to be furnished or performed upon property other than that of Applicant, Applicant shall first procure from such owners all necessary rights-of-way and/or permits in a form satisfactory to PG&E and without cost to it.

2. Applicant shall indemnify and hold harmless PG&E, its officers, agents and employees, against all loss, damage, expense and liability resulting from injury to or death of any person, including but not limited to, employees of PG&E, Applicant or any third party, or for the loss, destruction or damage to property, including, but not limited to property of PG&E, Applicant or any third party, arising out of or in any way connected with the performance of this agreement, however caused, except to the extent caused by the active negligence or willful misconduct of PG&E, its officers, agents and employees. Applicant will, on PG&E's request, defend any suit asserting a claim covered by this indemnity. Applicant will pay all costs that may be incurred by PG&E in enforcing this indemnity, including reasonable attorneys' fees.

3. The location and requested work are described as follows: (Describe in detail the materials and facilities to be furnished and/or work to be performed by PG&E. If more space is required, use other side and attach any necessary drawings as Exhibits A, B, C, etc):

   LOCATION: SF Energy Reliability Project 23rd Street and Illinois Street, San Francisco, California.
   DESCRIPTION OF WORK: To initate final design and job approval for a gas service connection:
   - o Perform preliminary land work to determine refine route alternatives;
   - o Develop construction drawings;
   - o Negotiate easements and rights-of-way;
   - o Finalize pipeline route;
   - o Develop detailed job estimate, including meter set design; and
   - o Develop Distribution Service & Extension and Special Facilities Agreement

4. Applicant shall pay to PG&E, promptly upon demand by PG&E, as the complete contract price hereunder, the sum of Forty five thousand dollars to initate work to develop job quality estimates and to provide final agreements to provide gas service to Applicant's facility dollars ($ 45,000.00).

   Upon completion of requested work, ownership shall vest in: ☒ PG&E ☐ Applicant

Executed this ________ day of ______________ 19 ____.

SF PUC Hetch Hetchy DWP Applicant	PACIFIC GAS & ELECTRIC COMPANY
By: ______________________	By: ______________________
______________________ (Print/Type/Name)	M. Kirk Johnson (Print/Type Name)
Title: ______________________	Title: Director, Gas System Operations

Mailing Address: 21155 Market Street, 4th Floor
San Francisco, CA 94103

62-4527 (Rev 1/91)
Service Planning
Advice No. 1633-G/1342-E
Effective 4/02/91

PG&E
Pacific Gas and Electric Company

Agreement to Perform Tariff Schedule Related Work

DISTRIBUTION:
☒ APPLICANT (Original)
☒ DIVISION (Original)
☐ ACCTG. SVCS.

REFERENCE:
SF PUC Hetch Hetchy DWP
CGT - GSO - GSM&TS

San Francisco PUC Hetch Hetchy Department of Water and Power (Applicant) has requested PACIFIC GAS AND ELECTRIC COMPANY, a California corporation (PG&E), to perform the tariff schedule related work as located and described in paragraph 3 herein.

PG&E agrees to perform the requested work and furnish all necessary labor, equipment, materials and related facilities required therefor, subject to the following conditions:

1. Whenever part or all of the requested work is to be furnished or performed upon property other than that of Applicant, Applicant shall first procure from such owners all necessary rights-of-way and/or permits in a form satisfactory to PG&E and without cost to it.

2. Applicant shall indemnify and hold harmless PG&E, its officers, agents and employees, against all loss, damage, expense and liability resulting from injury to or death of any person, including but not limited to, employees of PG&E, Applicant or any third party, or for the loss, destruction or damage to property, including, but not limited to property of PG&E, Applicant or any third party, arising out of or in any way connected with the performance of this agreement, however caused, except to the extent caused by the active negligence or willful misconduct of PG&E, its officers, agents and employees. Applicant will, on PG&E's request, defend any suit asserting a claim covered by this indemnity. Applicant will pay all costs that may be incurred by PG&E in enforcing this indemnity, including reasonable attorneys' fees.

3. The location and requested work are described as follows: (Describe in detail the materials and facilities to be furnished and/or work to be performed by PG&E. If more space is required, use other side and attach any necessary drawings as Exhibits A, B, C, etc):

   LOCATION: SF Energy Reliability Project 23rd Street and Illinois Street, San Francisco, California.
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   - o Negotiate easements and rights-of-way;
   - o Finalize pipeline route;
   - o Develop detailed job estimate, including meter set design; and
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   Upon completion of requested work, ownership shall vest in: ☒ PG&E ☐ Applicant

Executed this ________ day of ________________ 19 _____.

SF PUC Hetch Hetchy DWP
Applicant

By: ____________________

____
(Print/Type/Name)

Title: ____________________

Mailing Address: 21155 Market Street, 4th Floor
San Francisco, CA 94103

PACIFIC GAS & ELECTRIC COMPANY

By: ____________________

M. Kirk Johnson
(Print/Type Name)

Title: Director, Gas System Operations

APPENDIX 8.1A

Air Quality

APPENDIX 8.1

AIR QUALITY

APPENDIX 8.1A

EMISSIONS AND OPERATING PARAMETERS

Table 8.1A-1
Emissions and Operating Parameters for New Turbines
San Francisco Electric Reliability Project

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
	36 deg full load, no chilling	59 deg full load, w/chilling	80 deg full load, w/chilling	36 deg 50% load	59 deg 50% load	80 deg 50% load
Ambient Temp, F	36	59	80	36	59	80
GT Load, %	100	100	100	50	50	50
GT heat input, MMBtu/hr (HHV)	484.6	487.3	487.2	273.8	274.0	272.2
Stack flow, lb/hr	1,128,201	1,107,509	1,107,154	745,437	768,865	787,074
Stack flow, dscfm	228,475	222,850	222,710	152,936	158,413	162,980
Stack flow, acfm	619,922	620,308	620,356	412,259	411,857	407,798
Stack temp, F	805	826	826	819	782	744
Stack exhaust, vol %						
O2 (dry)	14.66	14.47	14.46	15.64	15.82	16.00
CO2 (dry)	3.59	3.70	3.70	3.03	2.93	2.83
H2O	10.33	11.18	11.22	8.73	8.16	7.48
Emissions						
NOx, ppmvd @ 15% O2	2.50	2.50	2.50	2.50	2.50	2.50
NOx, lb/hr	4.39	4.41	4.41	2.48	2.48	2.47
NOx, lb/MMBtu	0.0091	0.0090	0.0091	0.0091	0.0091	0.0091
SO2, ppmvd @ 15% O2	0.182	0.182	0.182	0.182	0.182	0.182
SO2, lb/hr	0.45	0.45	0.45	0.25	0.25	0.25
SO2, lb/MMBtu	0.00092	0.00092	0.00092	0.00092	0.00092	0.00092
CO, ppmvd @ 15% O2	4.00	4.00	4.00	4.00	4.00	4.00
CO, lb/hr	4.28	4.30	4.30	2.42	2.42	2.40
CO, lb/MMBtu	0.0088	0.0088	0.0088	0.0088	0.0088	0.0088
VOC, ppmvd @ 15% O2	2.00	2.00	2.00	2.00	2.00	2.00
VOC, lb/hr	1.22	1.23	1.23	0.69	0.69	0.69
VOC, lb/MMBtu	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
PM10, lb/hr	3.0	3.0	3.0	3.0	3.0	3.0
PM10, lb/MMBtu	0.0062	0.0062	0.0062	0.0110	0.0109	0.0110
PM10, gr/dscf	0.00153	0.00157	0.00157	0.00229	0.00221	0.00215
NH3, ppmvd@15% O2	10.0	10.0	10.0	10.0	10.0	10.0
NH3, lb/hr	6.50	6.54	6.53	3.67	3.67	3.65

Table 8.1A-2
Calculation of Cooling Tower Emissions
San Francisco Electric Reliability Project

Cooling Tower Design Parameters	
Water Flow Rate, 10E6 lbm/hr	1.96
Water Flow Rate, gal/min	3,912.0
Drift Rate, %	0.0010
Drift, lbm water/hr	19.55
PM10 Emissions based on TDS Level	
TDS level, ppm	2000
PM10, lb/hr (total, two cells)	0.04
PM10, tpy (total, two cells)	0.17

Table 8.1A-3
Calculation of Annual Fuel Use
San Francisco Electric Reliability Project

487.3	MMBtu/hr of natural gas per turbine at 36 deg F
1,017	Btu/cf
11,700	MMBtu/day of natural gas per turbine
8,760	hours per year of operation per turbine (equivalent)
4,268,700	MMBtu per year of natural gas per turbine
4,197.4	MMcf per year of natural gas per turbine
12,000	hours per year of operation, total, 3 turbines
5,847,600	MMBtu per year of natural gas total
5,750	MMcf per year of natural gas total

Table 8.1A-4
Detailed Calculations for Maximum Hourly, Daily and Annual Criteria Pollutant Emissions
San Francisco Electric Reliability Project

		Base Load		Startup/Shutdown		NOx			SO2	CO			POC		PM10
	max. hour	hrs/day	hrs/yr	hrs/day	hrs/yr	Maximum lb/hr	Ann. Avg. lb/hr	Startup/Shutdown lb/hr (1)	lb/hr	Maximum lb/hr	Ann. Avg. lb/hr	Startup lb/hr	Maximum lb/hr	Startup lb/hr (1)	lb/hr
Each Turbine	1	20	3750	4	250	4.41	4.41	40.0	0.45	4.30	4.30	10.00	1.23	2.00	3.0

	NOx			SO2			CO			POC			PM10		
	Max lb/hr	Max lb/day	Total tpy	Max lb/hr	Max lb/day	Total tpy	Max lb/hr	Max lb/day	Total tpy	Max lb/hr	Max lb/day	Total tpy	Max lb/hr	Max lb/day	Total tpy
Turbine 1	40.0	248.2	13.3	0.45	10.8	0.9	10.0	126.0	9.3	2.0	32.6	2.6	3.0	72.0	6
Turbine 2	40.0	248.2	13.3	0.45	10.8	0.9	10.0	126.0	9.3	2.0	32.6	2.6	3.0	72.0	6
Turbine 3	40.0	248.2	13.3	0.45	10.8	0.9	10.0	126.0	9.3	2.0	32.6	2.6	3.0	72.0	6
Total, 3 Turbines	120.0	744.6	39.8	1.35	32.3	2.7	30.0	378.0	27.9	6.0	97.8	7.67	9.0	216.0	18.0
Cooling Tower	--	--	--	--	--	--	--	--	--	--	--	--	0.04	0.9	0.2
Facility Total	120.0	744.6	39.8	1.3	32.3	2.7	30.0	378.0	27.9	6.0	97.8	7.7	9.0	216.9	18.2

Table 8.1A-5
Calculation of Noncriteria Pollutant Emissions from Gas Turbines
San Francisco Electric Reliability Project

Compound	Emission Factor, lb/MMscf (2)	Maximum Hourly Emissions, lb/hr Each CTG (3)	Maximum Hourly Emissions, lb/hr Total, 3 CTGs	Total Annual Emissions, 3 CTGs lb/yr	Total Annual Emissions, 3 CTGs tpy
Ammonia	(5)	6.54	19.62	78,480.0	39.2
Propylene	7.71E-01	0.37	1.11	4,433.3	2.2
Hazardous Air Pollutants					
Acetaldehyde	4.08E-02	1.95E-02	5.86E-02	234.6	0.12
Acrolein	3.69E-03	1.77E-03	5.30E-03	21.2	1.06E-02
Benzene	3.33E-03	1.60E-03	4.79E-03	19.1	9.57E-03
1,3-Butadiene	4.39E-04	2.10E-04	6.31E-04	2.5	1.26E-03
Ethylbenzene	3.26E-02	1.56E-02	4.69E-02	187.5	9.37E-02
Formaldehyde	3.67E-01	0.18	0.53	2,110.3	1.06
Hexane	2.59E-01	0.12	0.37	1,489.3	0.74
Naphthalene	1.66E-03	7.95E-04	2.39E-03	9.5	4.77E-03
PAHs (listed individually below)	1.79E-04	8.58E-05	2.57E-04	1.0	5.15E-04
Anthracene	3.38E-05				
Benzo(a)anthracene	2.26E-05				
Benzo(a)pyrene	1.39E-05				
Benzo(b)fluoranthrene	1.13E-05				
Benzo(k)fluoranthrene	1.10E-05				
Chrysene	2.52E-05				
Dibenz(a,h)anthracene	2.35E-05				
Indeno(1,2,3-cd)pyrene	2.35E-05				
Propylene oxide	2.96E-02	1.42E-02	4.25E-02	170.2	0.09
Toluene	1.33E-01	6.37E-02	0.19	764.8	0.38
Xylene	6.53E-02	3.13E-02	0.09	375.5	0.19
Total HAPs			1.35	5,385.4	2.69

Notes:

(1) All factors except PAHs, hexane and propylene from AP-42, Table 3.4-1. Acrolein, benzene and formaldehyde reflect oxidation catalyst. Individual PAHs, hexane and propylene are CATEF mean results as AP-42 does not include factors for these compounds.
(2) Based on maximum hourly turbine fuel use of 487.3 MMBtu/hr and fuel HHV of 1017 Btu/scf. 0.48 MMscf/hr
(3) Based on total annual fuel use of 5,847,600 MMBtu/yr and fuel HHV of 1017 Btu/scf. 5,750.0 MMscf/yr
(4) Based on 10 ppm ammonia slip from SCR system.

Table 8.1A-6
Calculation of Noncriteria Pollutant Emissions from Cooling Tower (1)
San Francisco Electric Reliability Project

Constituent	Concentration in Cooling Tower Return Water	Emissions, lb/hr	Emissions, lb/day	Emissions, ton/yr	BAAQMD TAC Trigger Level, lb/yr
Ammonia	1 ppb	3.91E-08	9.39E-07	3.43E-04	1.93E+04
Arsenic	10 ppb	3.91E-07	9.39E-06	3.43E-03	2.40E-02
Cadmium	1.5 ppb	5.87E-08	1.41E-06	5.14E-04	4.60E-02
Chromium III (2)	6.5 ppb	2.54E-07	6.10E-06	2.23E-03	n/a
Copper	73 ppb	2.85E-06	6.85E-05	2.50E-02	4.63E+02
Lead	12.5 ppb	4.89E-07	1.17E-05	4.28E-03	2.90E+01
Mercury	0.1 ppb	3.91E-09	9.39E-08	3.43E-05	5.79E+01
Nickel	19.5 ppb	7.63E-07	1.83E-05	6.68E-03	7.30E-01
PAHs	0.8 ppb	3.13E-08	7.51E-07	2.74E-04	4.40E-02
PCBs	0.5 ppb	1.96E-08	4.69E-07	1.71E-04	6.80E-03
Zinc	309 ppb	1.21E-05	2.90E-04	1.06E-01	6.76E+03

Note: (1) Emissions calculated from maximum drift rate of 19.55 lb/hr
(2) Speciation of water sample indicates that all chromium is in the form of Cr3. Concentration of Cr6+ is non-detectable at the detection level of RL<0.1 micrograms/liter.

APPENDIX 8.1B

Modeling Analysis

APPENDIX 8.1B

MODELING ANALYSIS

POTRERO POWER PLANT 1992 METEOROLOGICAL DATA SET

1992 WIND FREQUENCY DISTRIBUTION: ANNUAL

WIND SPEED AT 10 M HEIGHT (M/S)

WIND SPEED (M/S)

SECTOR	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10+	TOTAL
N	38.	129.	177.	98.	29.	9.	0.	0.	0.	0.	0.	480.
NNE	25.	121.	184.	69.	13.	6.	4.	0.	0.	0.	0.	422.
NE	24.	132.	74.	14.	10.	1.	3.	1.	0.	0.	0.	259.
ENE	24.	74.	22.	6.	4.	1.	0.	0.	0.	0.	0.	131.
E	25.	94.	32.	5.	3.	1.	0.	0.	0.	0.	0.	160.
ESE	15.	64.	54.	14.	6.	3.	1.	0.	0.	0.	0.	157.
SE	19.	56.	56.	34.	13.	19.	10.	9.	3.	3.	1.	223.
SSE	30.	62.	70.	63.	41.	56.	36.	26.	5.	7.	0.	396.
S	76.	88.	86.	61.	86.	38.	17.	17.	7.	8.	4.	488.
SSW	48.	83.	48.	31.	22.	7.	1.	1.	0.	0.	0.	241.
SW	81.	230.	238.	183.	43.	12.	3.	0.	0.	0.	0.	790.
WSW	103.	352.	831.	614.	321.	87.	11.	0.	0.	0.	0.	2319.
W	84.	229.	368.	292.	205.	102.	38.	8.	0.	0.	0.	1326.
WNW	60.	137.	147.	180.	107.	55.	24.	9.	1.	0.	0.	720.
NW	70.	103.	70.	41.	28.	3.	0.	0.	0.	0.	0.	315.
NNW	44.	87.	126.	66.	26.	7.	1.	0.	0.	0.	0.	357.
TOTAL	766.	2041.	2583.	1771.	957.	407.	149.	71.	16.	18.	5.	8784.

AVERAGE ANNUAL WIND SPEED (M/S) = 2.813

1992 WIND FREQUENCY DISTRIBUTION: FIRST QUARTER
WIND SPEED AT 10 M HEIGHT (M/S)

WIND SPEED (M/S)

SECTOR	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10+	TOTAL
N	14.	75.	86.	65.	21.	5.	0.	0.	0.	0.	0.	266.
NNE	16.	57.	130.	54.	6.	3.	2.	0.	0.	0.	0.	268.
NE	15.	56.	48.	8.	5.	1.	0.	1.	0.	0.	0.	134.
ENE	12.	29.	9.	2.	1.	0.	0.	0.	0.	0.	0.	53.
E	13.	23.	8.	1.	0.	0.	0.	0.	0.	0.	0.	45.
ESE	4.	17.	15.	4.	1.	0.	0.	0.	0.	0.	0.	41.
SE	9.	33.	15.	11.	5.	2.	0.	0.	0.	0.	0.	75.
SSE	14.	29.	40.	28.	17.	27.	14.	7.	1.	5.	0.	182.
S	18.	51.	53.	46.	75.	33.	15.	16.	6.	8.	4.	325.
SSW	12.	35.	20.	18.	15.	6.	1.	1.	0.	0.	0.	108.
SW	25.	28.	18.	10.	3.	0.	0.	0.	0.	0.	0.	84.
WSW	17.	33.	31.	9.	6.	1.	0.	0.	0.	0.	0.	97.
W	20.	41.	42.	32.	15.	3.	2.	0.	0.	0.	0.	155.
WNW	15.	45.	29.	29.	16.	9.	1.	1.	0.	0.	0.	145.
NW	29.	23.	23.	20.	16.	3.	0.	0.	0.	0.	0.	114.
NNW	19.	44.	25.	2.	2.	0.	0.	0.	0.	0.	0.	92.
TOTAL	252.	619.	592.	339.	204.	93.	35.	26.	7.	13.	4.	2184.

1992 WIND FREQUENCY DISTRIBUTION: SECOND QUARTER
WIND SPEED AT 10 M HEIGHT (M/S)

SECTOR	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10+	TOTAL
						WIND SPEED (M/S)						
N	1.	4.	9.	1.	0.	0.	0.	0.	0.	0.	0.	15.
NNE	0.	7.	14.	6.	0.	0.	0.	0.	0.	0.	0.	27.
NE	0.	14.	7.	1.	0.	0.	0.	0.	0.	0.	0.	22.
ENE	3.	13.	3.	0.	0.	0.	0.	0.	0.	0.	0.	19.
E	1.	16.	6.	0.	0.	0.	0.	0.	0.	0.	0.	23.
ESE	3.	20.	15.	3.	0.	0.	0.	0.	0.	0.	0.	41.
SE	1.	7.	13.	5.	0.	0.	3.	2.	1.	0.	0.	32.
SSE	5.	4.	4.	6.	5.	6.	0.	0.	0.	0.	0.	30.
S	6.	10.	11.	6.	4.	5.	0.	0.	0.	0.	0.	42.
SSW	11.	19.	14.	3.	0.	0.	0.	0.	0.	0.	0.	47.
SW	19.	77.	76.	79.	8.	2.	0.	0.	0.	0.	0.	261.
WSW	18.	86.	218.	255.	167.	60.	6.	0.	0.	0.	0.	810.
W	11.	54.	119.	122.	91.	63.	19.	4.	0.	0.	0.	483.
WNW	6.	27.	60.	78.	52.	34.	18.	8.	1.	0.	0.	284.
NW	4.	6.	8.	8.	2.	0.	0.	0.	0.	0.	0.	28.
NNW	1.	2.	8.	2.	3.	3.	1.	0.	0.	0.	0.	20.
TOTAL	90.	366.	585.	575.	332.	173.	47.	14.	2.	0.	0.	2184.

1992 WIND FREQUENCY DISTRIBUTION: THIRD QUARTER
WIND SPEED AT 10 M HEIGHT (M/S)

SECTOR	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10+	TOTAL
						WIND SPEED (M/S)						
N	9.	2.	3.	2.	0.	0.	0.	0.	0.	0.	0.	16.
NNE	4.	6.	12.	1.	0.	0.	0.	0.	0.	0.	0.	23.
NE	3.	24.	7.	0.	0.	0.	0.	0.	0.	0.	0.	34.
ENE	4.	16.	1.	0.	0.	0.	0.	0.	0.	0.	0.	21.
E	4.	18.	3.	0.	0.	0.	0.	0.	0.	0.	0.	25.
ESE	2.	8.	6.	1.	0.	0.	0.	0.	0.	0.	0.	17.
SE	0.	6.	4.	3.	0.	0.	0.	0.	0.	0.	0.	13.
SSE	1.	6.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.
S	5.	8.	1.	0.	0.	0.	0.	0.	0.	0.	0.	14.
SSW	7.	11.	5.	0.	0.	0.	0.	0.	0.	0.	0.	23.
SW	9.	69.	104.	71.	17.	1.	0.	0.	0.	0.	0.	271.
WSW	14.	143.	501.	303.	128.	26.	5.	0.	0.	0.	0.	1120.
W	25.	68.	138.	102.	83.	34.	17.	4.	0.	0.	0.	471.
WNW	10.	19.	15.	34.	19.	8.	5.	0.	0.	0.	0.	110.
NW	6.	15.	8.	1.	7.	0.	0.	0.	0.	0.	0.	37.
NNW	4.	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.	6.
TOTAL	107.	419.	810.	518.	254.	69.	27.	4.	0.	0.	0.	2208.

1992 WIND FREQUENCY DISTRIBUTION: FOURTH QUARTER
WIND SPEED AT 10 M HEIGHT (M/S)

	WIND SPEED (M/S)											
SECTOR	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10+	TOTAL
N	14.	48.	79.	30.	8.	4.	0.	0.	0.	0.	0.	183.
NNE	5.	51.	28.	8.	7.	3.	2.	0.	0.	0.	0.	104.
NE	6.	38.	12.	5.	5.	0.	3.	0.	0.	0.	0.	69.
ENE	5.	16.	9.	4.	3.	1.	0.	0.	0.	0.	0.	38.
E	7.	37.	15.	4.	3.	1.	0.	0.	0.	0.	0.	67.
ESE	6.	19.	18.	6.	5.	3.	1.	0.	0.	0.	0.	58.
SE	9.	10.	24.	15.	8.	17.	7.	7.	2.	3.	1.	103.
SSE	10.	23.	26.	29.	19.	23.	22.	19.	4.	2.	0.	177.
S	47.	19.	21.	9.	7.	0.	2.	1.	1.	0.	0.	107.
SSW	18.	18.	9.	10.	7.	1.	0.	0.	0.	0.	0.	63.
SW	28.	56.	40.	23.	15.	9.	3.	0.	0.	0.	0.	174.
WSW	54.	90.	81.	47.	20.	0.	0.	0.	0.	0.	0.	292.
W	28.	66.	69.	36.	16.	2.	0.	0.	0.	0.	0.	217.
WNW	29.	46.	43.	39.	20.	4.	0.	0.	0.	0.	0.	181.
NW	31.	59.	31.	12.	3.	0.	0.	0.	0.	0.	0.	136.
NNW	20.	41.	91.	62.	21.	4.	0.	0.	0.	0.	0.	239.
TOTAL	317.	637.	596.	339.	167.	72.	40.	27.	7.	5.	1.	2208.

Table 8.1B-1
Dimensions of On-Site Structures
SFERP

Feature	Height (feet)	Length (feet)	Width (feet)	Diameter (feet)
CTGs				
Combustion turbines & generators (base unit)	14.5	56.5	13.5	--
Inlet air filters	12	33	37	--
SCR casings	33	60	25	--
CTG stacks	85	--	--	12
Chiller cooling tower	40	50	14	--
Tanks				
DI water storage tank	32	--	--	42
Treated water storage tank	32	--	--	60
Aqueous ammonia storage tank	--	30	--	8
Water treatment building	32	150	64.4	--
Plant service bldg	21	186	75	--
Electrical bldg	21	100	42	--
Admin/control bldg	28	92	44	--

Figure 8.1B-1

Building Layout for GEP Analysis

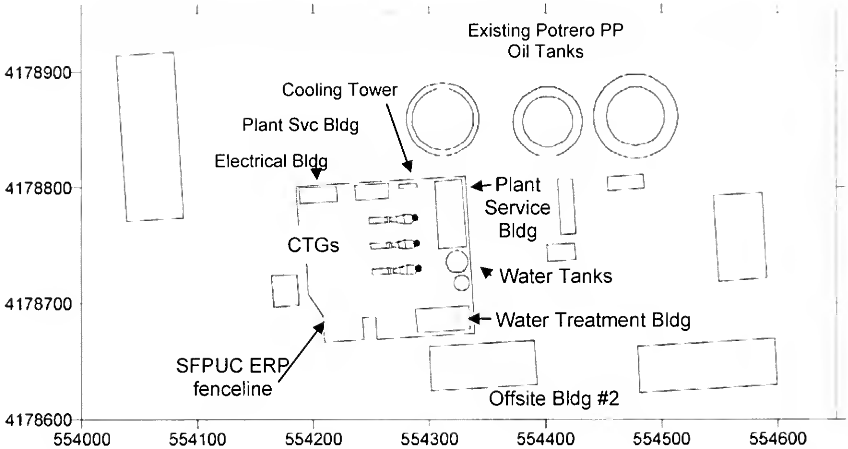


Table 8.1B-2
Emissions and Stack Parameters for Screening Modeling
SFPUC ERP

Turbine Case	Turbine Load, %	Ambient Temp (deg F)	Ambient Temp (deg K)	Stack Diam (m)	Stack Height (m)	Exhaust Temp (deg K)	Exhaust Velocity (m/s)
1	100	36	275.22	3.658	25.908	702.444	27.845
2	100	59	288.00	3.658	25.908	714.111	27.862
3	100	80	299.67	3.658	25.908	714.111	27.865
4	50	36	275.22	3.658	25.908	710.222	18.517
5	50	59	288.00	3.658	25.908	689.667	18.499
6	50	80	299.67	3.658	25.908	668.556	18.317

Note: Parameters are for each turbine.

Table 8.1B-3
Results of the Unit Impact and Turbine Screening Analysis
San Francisco Electric Reliability Project

Turbine Case	Modeled Unit Impact, ug/m3 per 3.0 g/s				
	1-hr	3-hr	8-hr	24-hr	annual
	1992 Met Data				
1	15.021	8.360	4 794	1.902	0 249
2	14 850	8 289	4 755	1.886	0.246
3	14 849	8 288	4 754	1.886	0.246
4	21.765	10 696	6.447	2.433	0 343
5	22.152	10.829	6.539	2.463	0.348
6	22.754	10 029	6 680	2.508	0.358

Turbine Case	Emission Rates by Pollutant and Averaging Period Modeling (lb/hr)											
	NOx			SO2				CO			PM10	
	1-hr	Startup	Annual avg	1-hr	3-hr	24-hr	Annual avg	1-hr	Startup	8-hr	24-hr	Annual avg
1	4.39	--	3.02	0.45	0.45	0.45	0.20	4.28	--	7.14	3.00	1.37
2	4 41	--	3.03	0.45	0.45	0.45	0 20	4 30	--	7.15	3.00	1 37
3	4.41	--	3.03	0.45	0.45	0.45	0 20	4.30	--	7.15	3 00	1 37
4	2.48	40	2.20	0.25	0.25	0 25	0.11	2 42	10	6.21	3.00	1 37
5	2.48	40	2.20	0 25	0.25	0.25	0.12	2.42	10	6.21	3.00	1 37
6	2.47	40	2.20	0.25	0.25	0.25	0.11	2.40	10	6.20	3.00	1.37

Turbine Case	Emission Rates by Pollutant and Averaging Period Modeling (g/s)											
	NOx			SO2				CO			PM10	
	1-hr	Startup	annual avg	1-hr	3-hr	24-hr	annual avg	1-hr	Startup	8-hr	24-hr	annual avg
1	0.553	--	0.381	0.056	0.056	0.056	0.026	0.539	--	0.900	0.378	0.173
2	0.556	--	0.382	0.057	0.057	0.057	0.026	0.542	--	0.901	0.378	0.173
3	0.556	--	0.382	0.056	0.056	0.056	0.026	0.542	--	0.901	0.378	0.173
4	0.312	5.04	0.278	0.032	0.032	0.032	0.014	0.305	1.26	0.782	0.378	0.173
5	0.312	5.04	0.278	0.032	0.032	0.032	0.015	0.305	1.26	0.782	0 378	0.173
6	0.311	5.04	0.277	0.032	0.032	0 032	0.014	0.302	1.26	0.781	0.378	0.173

Turbine Case	Load/ Ambient Temp	Modeled Impacts for Three CTGs, ug/m3, by Pollutant and Averaging Period											
		NOx			SO2				CO			PM10	
		1-hr	Startup	Annual	1-hr	3-hr	24-hr	Annual	1-hr	Startup	8-hr	24-hr	Annual
1	100% 36 deg	**8.31**	--	0.095	**0.844**	**0.469**	**0.1068**	**0.00639**	**8.10**	--	4 31	0 72	0.043
2	100% 59 deg w/ chilling	8.25	--	0.094	0.839	0.468	0.1066	0.00636	8.05	--	4.28	0.71	0 043
3	100% 80 deg w/ chilling	8.25	--	0.094	0.838	0.468	0.1065	0.00635	8.04	--	4 28	0.71	0 043
4	50% 36 deg	6 80	109.70	0.095	0.69	0.34	0.077	0.005	6 64	27 42	5 04	0.92	0.059
5	50% 59 deg	6.92	111.65	0.097	0.70	0 34	0.078	0.005	6.75	27.91	5.12	0.93	0 060
6	50% 80 deg	7.08	**114.68**	**0.099**	0.72	0.32	0.080	0.005	6 88	**28.67**	**5.22**	**0.95**	**0.062**

Table 8.1B-4
Emission Rates and Stack Parameters for Refined Modeling
San Francisco Electric Reliability Project

	Stack Diam, m	Stack Height, m	Exh Temp, Deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rate, g/s			
						NOx	SO2	CO	PM10
Averaging Period: 24 hours, PM10									
Each Turbine	3.658	25.908	668.56	192.46	18.317	n/a	n/a	n/a	3.78E-01
Cooling Towers (each cell)	3.962	12.764	294.11	101.45	8.227	n/a	n/a	n/a	2.46E-03
Averaging Period: Annual, PM10									
Each Turbine	3.658	25.908	668.56	192.46	18.317	n/a	n/a	n/a	3.78E-01
Cooling Towers (each cell)	3.962	12.764	294.11	101.45	8.227	n/a	n/a	n/a	2.46E-03

Table 8.1B-5
Analysis of Impacts due to Inversion Breakup Fumigation
San Francisco Electric Reliability Project

CTG Emission Rates, g/s

	NOx	CO	PM10	SO2
Case 1	0.553	0.539	0.378	0.0562
Case 2	0.556	0.542	0.378	0.0565
Case 3	0.556	0.542	0.378	0.0565
Case 4	0.312	0.305	0.378	0.0317
Case 5	0.312	0.305	0.378	0.0318
Case 6	0.311	0.302	0.378	0.0316

Inversion Breakup Modeling Results from SCREEN3

	Unit Impacts, ug/m3 per g/s	Maximum One-Hour Avg Impacts, ug/m3				Distance to Maximum (m)
		NOx	CO	PM10	SO2	
Case 1	0.9943	0.5500	0.5362	0.3758	0.0558	19,058
Case 2	0.9858	0.5478	0.5341	0.3726	0.0557	19,178
Case 3	0.9857	0.5477	0.5341	0.3726	0.0557	19,179
Case 4	1.313	0.4103	0.4004	0.4963	0.0416	15,545
Case 5	1.333	0.4165	0.4065	0.5039	0.0423	15,373
Case 6	1.364	0.4245	0.4125	0.5156	0.0431	15,117

Flat Terrain Modeling Results from SCREEN3

	Unit Impacts, ug/m3 per g/s	Maximum One-Hour Avg Impacts, ug/m3				Distance to Maximum (m)
		NOx	CO	PM10	SO2	
Case 1	0.6965	0.3853	0.3756	0.2633	0.0391	1201
Case 2	0.6886	0.3826	0.3731	0.2603	0.0389	1205
Case 3	0.6885	0.3826	0.3730	0.2603	0.0389	1205
Case 4	1.006	0.3144	0.3067	0.3803	0.0319	1074
Case 5	1.014	0.3169	0.3092	0.3833	0.0322	1072
Case 6	1.018	0.3168	0.3078	0.3848	0.0321	1072

Adjust unit impacts for longer averaging periods to account for 90-minute duration of fumigation

	1-hr unit	3-hr unit	8-hr unit	24-hr unit
Case 1	0.9943	0.8454	0.7523	0.7151
Case 2	0.9858	0.8372	0.7443	0.7072
Case 3	0.9857	0.8371	0.7442	0.7071
Case 4	1.3130	1.1595	1.0636	1.0252
Case 5	1.3330	1.1735	1.0738	1.0339
Case 6	1.3640	1.1910	1.0829	1.0396

Table 8.1B-5 (cont'd)

Calculation of Fumigation Impacts for Three Units

Case/Avg Period	NOx	CO	PM10	SO2
One-Hour				
Case 1	1.6500	1.6086	-	0.1675
Case 2	1.6433	1.6023	-	0.1671
Case 3	1.6431	1.6022	-	0.1670
Case 4	1.2309	1.2011	-	0.1249
Case 5	1.2496	1.2194	-	0.1270
Case 6	1.2735	1.2374	-	0.1292
3 Hours				
Case 1	-	-	-	0.1282
Case 2	-	-	-	0.1504
Case 3	-	-	-	0.1503
Case 4	-	-	-	0.1124
Case 5	-	-	-	0.1143
Case 6	-	-	-	0.1162
8 Hours				
Case 1	-	0.8520	-	-
Case 2	-	0.8469	-	-
Case 3	-	0.8468	-	-
Case 4	-	0.6810	-	-
Case 5	-	0.6876	-	-
Case 6	-	0.6877	-	-
24 Hours				
Case 1	-	-	0.3244	0.0482
Case 2	-	-	0.3208	0.0480
Case 3	-	-	0.3207	0.0479
Case 4	-	-	0.4650	0.0390
Case 5	-	-	0.4690	0.0394
Case 6	-	-	0.4716	0.0394

NOTES TO TABLE 8.1B-5

INVERSION BREAKUP FUMIGATION ANALYSIS

Inversion breakup fumigation is generally a short-term phenomenon and was evaluated here as persisting for up to 90 minutes. SCREEN3 was used to model one-hour unit impacts from the turbines under 2.5 m/s winds and F stability (for fumigation impacts) and under all meteorological conditions (shown in the table as "Inversion Breakup Modeling Results from SCREEN3").

For longer-term averaging periods, impacts were calculated using the highest modeled impact from SCREEN3 for the corresponding averaging period. A sample calculation for 24-hour average PM_{10} for Case 1 is as follows:

- For a single turbine, Case 1, 1-hour average unit impact = 0.9943 ug/m3 per g/s
- For a single turbine, Case 1, max. 1-hour average unit impact from SCREEN3 = 0.6965 ug/m3 per g/s
- For a single turbine, the appropriate unit impact for the 24-hour averaging period is calculated as 1.5 hours of inversion breakup fumigation plus 22.5 hours of operation under typical conditions (from SCREEN3): [(1.5 * 0.9943 ug/m3 per g/s) + (22.5 * 0.6965 ug/m3 per g/s)] ÷ 24 hrs = 0.7151 ug/m^3 per g/s
- For three turbines with an emission rate of 0.378 g/s, the total 24-hour average PM_{10} impact under inversion breakup fumigation conditions is: 0.7151 ug/m^3 per g/s * 0.378 g/s per turbine* 0.4 [persistence factor for converting 1-hour average screening impact into 24-hour average concentration] * 3 turbines = 0.3244 ug/m^3

Table 8.1B-6
Analysis of Impacts due to Shoreline Fumigation
San Francisco Electric Reliability Project

CTG Emission Rates, g/s

	NOx	CO	PM10	SO2
Case 1	0.553	0.539	0.378	0.056
Case 2	0.556	0.542	0.378	0.057
Case 3	0.556	0.542	0.378	0.056
Case 4	0.312	0.305	0.378	0.032
Case 5	0.312	0.305	0.378	0.032
Case 6	0.311	0.302	0.378	0.032

Shoreline Fumigation Modeling Results from SCREEN3

	Unit Impacts,	Maximum One-Hour Avg Impacts, ug/m3				Distance to
	ug/m3 per g/s	NOx	CO	PM10	SO2	Maximum (m)
Case 1	6.358	3.5169	3.4287	2.4033	0.3571	1837
Case 2	6.299	3.5001	3.4128	2.3810	0.3560	1852
Case 3	6.298	3.4995	3.4123	2.3806	0.3556	1852
Case 4	8.602	2.6880	2.6229	3.2516	0.2728	1409
Case 5	8.745	2.7326	2.6665	3.3056	0.2778	1389
Case 6	8.966	2.7904	2.7113	3.3891	0.2830	1358

Flat Terrain Modeling Results from SCREEN3

	Unit Impacts,	Maximum One-Hour Avg Impacts, ug/m3				Distance to
	ug/m3 per g/s	NOx	CO	PM10	SO2	Maximum (m)
Case 1	0.6965	0.3853	0.3756	0.2633	0.0391	1201
Case 2	0.6886	0.3826	0.3731	0.2603	0.0389	1205
Case 3	0.6885	0.3826	0.3730	0.2603	0.0389	1205
Case 4	1.006	0.3144	0.3067	0.3803	0.0319	1074
Case 5	1.014	0.3169	0.3092	0.3833	0.0322	1072
Case 6	1.018	0.3168	0.3078	0.3848	0.0321	1072

Adjust unit impacts for longer averaging periods to account for three-hour duration of fumigation

	1-hr unit	3-hr unit	8-hr unit	24-hr unit
Case 1	6.3580	6.3580	2.8196	1.4042
Case 2	6.2990	6.2990	2.7925	1.3899
Case 3	6.2980	6.2980	2.7921	1.3897
Case 4	8.6020	8.6020	3.8545	1.9555
Case 5	8.7450	8.7450	3.9131	1.9804
Case 6	8.9660	8.9660	3.9985	2.0115

Table 8.1B-6 (cont'd)

Calculation of Shoreline Fumigation Impacts for Three Units

Case/Avg Period	NOx	CO	PM10	SO2
One-Hour				
Case 1	10.55	10.29	-	1.07
Case 2	10.50	10.24	-	1.07
Case 3	10.50	10.24	-	1.07
Case 4	8.06	7.87	-	0.82
Case 5	8.20	8.00	-	0.83
Case 6	8.37	8.13	-	0.85
3 Hours				
Case 1	-	-	-	0.964
Case 2	-	-	-	0.961
Case 3	-	-	-	0.960
Case 4	-	-	-	0.737
Case 5	-	-	-	0.750
Case 6	-	-	-	0.764
8 Hours				
Case 1	-	3.19	-	-
Case 2	-	3.18	-	-
Case 3	-	3.18	-	-
Case 4	-	2.47	-	-
Case 5	-	2.51	-	-
Case 6	-	2.54	-	-
24 Hours				
Case 1	-	-	0.637	0.095
Case 2	-	-	0.630	0.094
Case 3	-	-	0.630	0.094
Case 4	-	-	0.887	0.074
Case 5	-	-	0.898	0.075
Case 6	-	-	0.912	0.076

NOTES TO TABLE 8.1B-6

SHORELINE FUMIGATION ANALYSIS

Shoreline fumigation was modeled for the turbines using SCREEN3 TIBL factors ranging from 2 to 6 at a distance to shoreline of 2000 meters. The turbines were found to have the highest impacts with a TIBL factor of 3; at TIBL factors greater than 3, the plume height was found to remain below the TIBL height.

Based on the analysis of wind persistence in the meteorological data set that was performed by URS for the Potrero 7 project at the same location, shoreline fumigation conditions were assumed to persist for up to 3 hours. For longer-term averaging periods, impacts were calculated using the highest modeled impact from SCREEN3 for the corresponding averaging period. A sample calculation for 24-hour average PM_{10} for Case 3 is as follows:

- For a single turbine, Case 1, 1-hour average unit impact = 6.358 ug/m3 per g/s
- For a single turbine, Case 1, max. 1-hour average unit impact from SCREEN3 = 0.6965 ug/m3 per g/s
- For a single turbine, 24-hour unit impact is calculated as 3 hours of shoreline fumigation plus 21 hours of operation under typical conditions (from SCREEN3): [(3 * 6.358 ug/m3 per g/s) + (21 * 0.6965 ug/m3 per g/s)] ÷ 24 hrs = 1.4042 ug/m^3 per g/s
- For three turbines with an emission rate of 0.378 g/s, the total 24-hour average PM_{10} impact under shoreline fumigation conditions is: 1.4042 ug/m^3 per g/s * 0.378 g/s per turbine* 0.4 [persistence factor for converting 1-hour average screening impact into 24-hour average concentration] * 3 turbines = 0.637 ug/m^3

Table 8.1B-7
Gas Turbine Commissioning Profile
San Francisco Electric Reliability Project

Operating Mode	Hours of Operation(1)	Fuel Use MMBtu/hr (2) (HHV)	Emission Factors (lbs/MMBtu)					Hourly Emissions (lbs/hr)			
			NOx(3)	CO(4)	VOC(5)	PM10(6)	SOx(7)	NOx	CO	VOC	PM10
Turbine 1 - FSNL	4	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 2 - FSNL	4	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 3 - FSNL	4	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 1 - Min. Load, no SCR or ox cat	20	96.9	0.15288	0.1501	0.0201	n/a	0.00092	14.82	14.55	1.95	3.0
Turbine 2 - Min. Load, no SCR or ox cat	20	96.9	0.15288	0.1501	0.0201	n/a	0.00092	14.82	14.55	1.95	3.0
Turbine 3 - Min. Load, no SCR or ox cat	20	96.9	0.15288	0.1501	0.0201	n/a	0.00092	14.82	14.55	1.95	3.0
Turbine 1 - FSNL (if necessary)	24	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 2 - FSNL (if necessary)	24	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 3 - FSNL (if necessary)	24	96.9	0.3640	0.2650	0.0755	n/a	0.00092	35.28	25.68	7.32	3.0
Turbine 1 - Multiple Load - Full SCR/ox cat	48	487.3	0.05915	0.0088	0.0025	n/a	0.00092	28.82	4.30	1.23	3.0
Turbine 2 - Multiple Load - Full SCR/ox cat	48	487.3	0.05915	0.0088	0.0025	n/a	0.00092	28.82	4.30	1.23	3.0
Turbine 3 - Multiple Load - Full SCR/ox cat	48	487.3	0.05915	0.0088	0.0025	n/a	0.00092	28.82	4.30	1.23	3.0
Total =	288										

Notes.
(1) Hours of Operation - based on information supplied by MID for the MEGS project
(2) Fuel Use
- No Load test Based on 20% of maximum heat input rating.
- Minimum Load test Based on 20% of maximum heat input rating
- Multiple Load test Based on 100% of maximum heat input rating
(3) NOx Emission Factors
- No Load test Based on 100 ppm @ 15% O2.
- Minimum Load test. Based on maximum uncontrolled emission rate of 42 ppm @ 15% O2
- Multiple Load Full SCR/ox cat test Based on NOx emission levels at the midway point between 30 ppm and 2.5 ppm @ 15% O2.
(4) CO Emission Factors
- No Load test. Based on maximum uncontrolled emission rate of 30 times controlled level, or 120 ppm @ 15% O2.
- Minimum Load test Based on maximum uncontrolled emission rate of 17 times controlled level, or 68 ppm @ 15% O2.
- Multiple Load Full SCR/ox cat test Based on unit meeting the project design level of 4 ppm @ 15% O2 with oxidation catalyst installed and operating.
(5) VOC Emission Factors
- No Load test. Based on maximum uncontrolled emission rate of 30 times controlled level, or 60 ppm @ 15% O2.
- Minimum Load test Based on maximum uncontrolled emission rate of 8 times controlled level, or 16 ppm @ 15% O2.
- Multiple Load Full SCR/ox cat test: Based on unit meeting the project design level of 2 ppm @ 15% O2 with oxidation catalyst installed and operating
(6) PM10 Emission Factors
- For all tests, based on project design PM10 level of 3 0 lbs/hr
(7) SOx Emission Factors
- For all tests, based on annual average natural gas sulfur content of 0.33 gr/100 scf

Figure 8.1B-2

Layout of the Receptor Grids

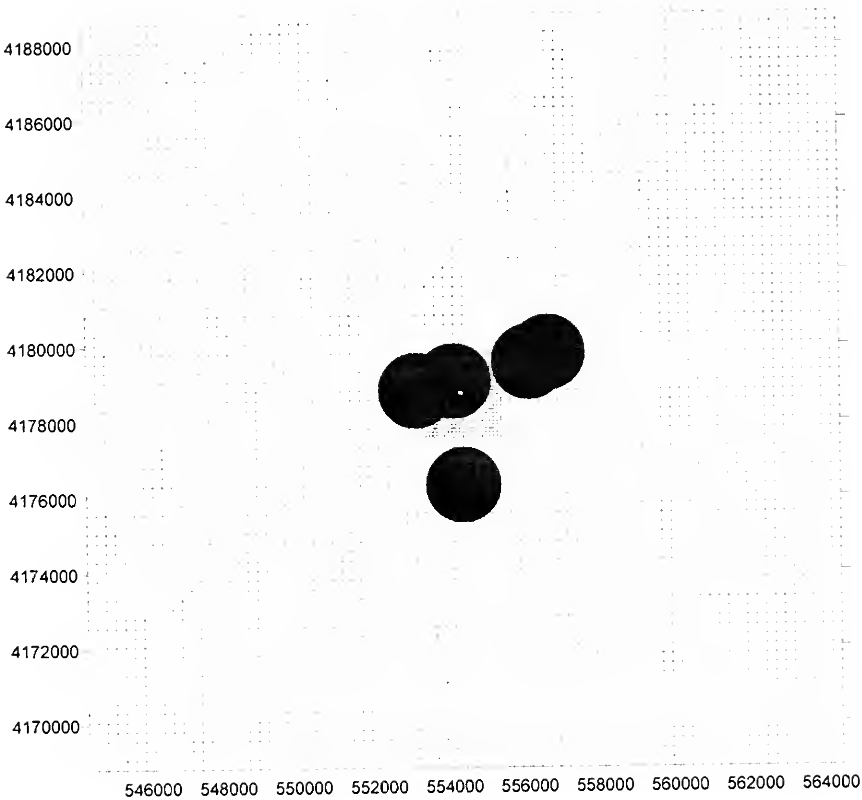


Figure 8.1B-3

Maximum 24-Hour Average PM_{10} Impacts During Project Operation

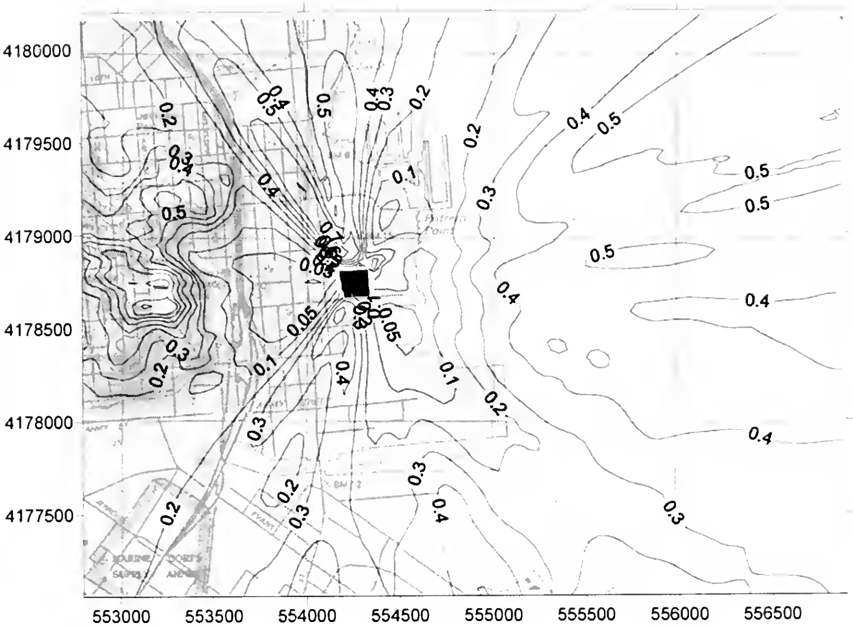
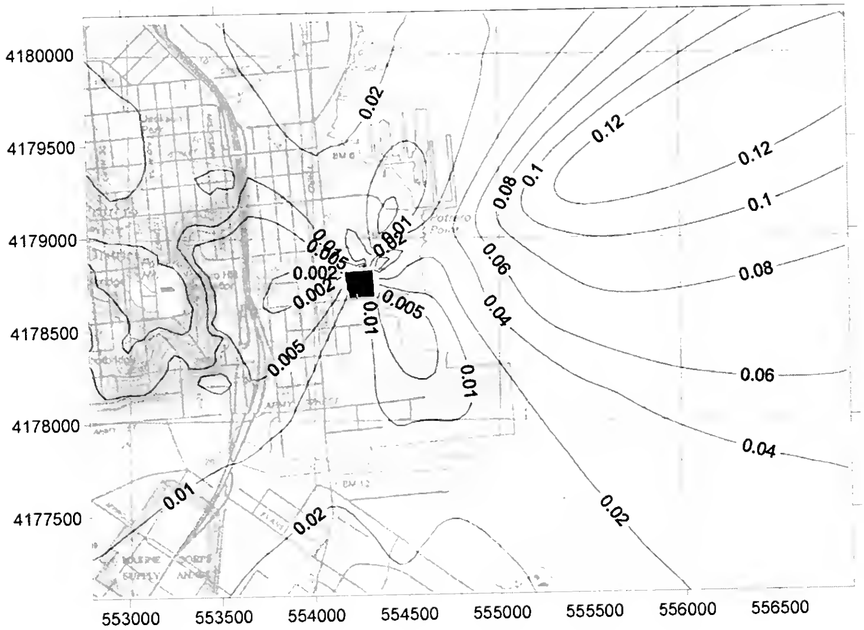


Figure 8.1B-4

Maximum Annual Average PM_{10} Impacts During Project Operation



APPENDIX 8.1C

Screening Health Risk Assessment

APPENDIX 8.1C

SCREENING HEALTH RISK ASSESSMENT

Table 8.1C-1
Calculation of Maximum Impacts of Hazardous Air Pollutants
San Francisco Electric Reliability Project

Turbine Case	Max. 1-hr Impact, ug/m3 per 3.0 g/s	Max. Annual Impact, ug/m3 per 3.0 g/s	Heat Input, MMBtu/hr	Product, 1-hr avg	Product, annual avg
1	15.0208	0.2492	484.6	7279.1	120.76
2	14.8501	0.2464	487.3	7236.5	120.07
3	14.8485	0.2463	487.2	7234.2	120.00
4	21.7654	0.3431	273.8	5959.4	93.9
5	22.1523	0.3483	274.0	6069.7	95.4
6	22.754	0.3582	272.2	6193.6	97.5

As emissions of HAPs from the CTGs are directly related to heat input, operating case with highest product of heat input and unit impact will have highest HAP impacts.
Thus Case 1 will be worst case for all impacts.

Compound (1)	Emission Rates for Modeling, g/s (per CTG)		Modeled Impacts, ug/m3 (total, three CTGs)	
	1-hr avg basis	annual avg basis	1-hr avg basis	annual avg basis
CTGs				
Ammonia	0.824	0.376	12.378	9.38E-02
Propylene	0.047	2.13E-02	0.699	5.30E-03
Acetaldehyde	2.46E-03	1.12E-03	3.70E-02	2.80E-04
Acrolein	2.23E-04	1.02E-04	3.35E-03	2.54E-05
Benzene	2.01E-04	9.18E-05	3.02E-03	2.29E-05
1,3-Butadiene	2.65E-05	1.21E-05	3.98E-04	3.02E-06
Ethylbenzene	1.97E-03	8.99E-04	2.96E-02	2.24E-04
Formaldehyde	2.22E-02	1.01E-02	3.33E-01	2.52E-03
Hexane	1.56E-02	7.14E-03	2.35E-01	1.78E-03
Naphthalene	1.00E-04	4.58E-05	1.51E-03	1.14E-05
PAHs	1.08E-05	4.93E-06	1.62E-04	1.23E-06
Propylene oxide	1.79E-03	8.16E-04	2.68E-02	2.03E-04
Toluene	8.03E-03	3.67E-03	0.121	9.14E-04
Xylene	3.94E-03	1.80E-03	5.92E-02	4.49E-04

Notes:
(1) CTG factors from Table 8.1A-5.

Table 8.1C-2
Acute Inhalation Hazard Index
San Francisco Electric Reliability Project

Pollutant Name	1-hr Conc, ug/m3	Acute REL, ug/m3 (1)	Toxicological Endpoints	Inhalation Hazard Index
Acrolein	3.35E-03	1.90E-01	Eye irritation	1.76E-02
Ammonia	1.24E+01	3.20E+03	Eye and respiratory irritation	3.87E-03
Benzene	3.02E-03	1.30E+03	Reproductive/ Developmental	2.32E-06
Formaldehyde	3.33E-01	9.40E+01	Eye irritation	3.54E-03
Propylene oxide	2.68E-02	3.10E+03	Eye and respiratory irritation	8.66E-06
Toluene	1.21E-01	3.70E+04	CNS (mild); Eye and respiratory irritation	3.26E-06
Xylenes	5.92E-02	2.20E+04	Eye and respiratory irritation	2.69E-06
Total Acute Hazard Index				**0.0250**

Table 8.1C-3
Chronic Inhalation Hazard Index
San Francisco Electric Reliability Project

	Pathway (1)							
	Resp	CV/BL	CNS	Skin	Repro	Kidn	GI/LV	Immun
Total Chronic	0.0018	<.0001	<.0001	0.0013	<.0001	<.0001	<.0001	--

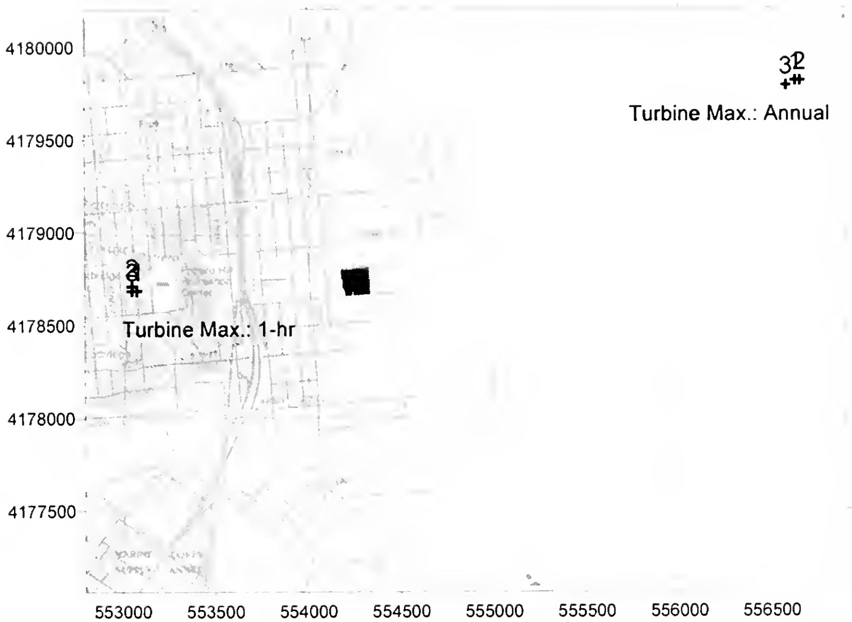
Notes:
(1) Resp: respiratory; CV/BL: cardiovascular/blood; CNS: central nervous system; Repro: reproductive system; Kidn: renal system; GI/LV: gastrointestinal/liver; Immun: immunological system

Table 8.1C-4
Individual Cancer Risk
San Francisco Electric Reliability Project

	Air	Soil	Skin	Garden	Mmilk	Other
CTGs	1.92E-08	2.03E-09	1.29E-09	0.00E+00	0.00E+00	0.00E+00
TOTAL RISK	**0.023 in one million**					

Figure 8.1C-1

Locations of Top Three Acute, Chronic and Cancer Risks



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Health Risk Assessment Program

Version 2.0e

ACUTE INHALATION EXPOSURE REPORT

Run Made By

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Sierra Research

Project : SFPUC ERP

Feb. 18, 2004

Pollutant Database Date : Nov. 15, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

MAX. 1-HR EMISSION RATE INFORMATION

File: 1HRAVG.M96

Pollutant Name	Emission Rate (g/s)
ACROLEIN	3.350E-03
AMMONIA	1.238E+01
BENZENE	3.020E-03
FORMALDEHYDE	3.330E-01
PROPYLENE OXIDE	2.680E-02
TOLUENE	1.210E-01
XYLENES	5.920E-02

ACUTE INHALATION HAZARD INDEX

Pollutant	Resp	CV/BL	CNS	Eye	Repro	Kidn	GI/LV	Immun
ACROLEIN	0.0176	--	--	0.0176	--	--	--	--
AMMONIA	0.0039	--	--	0.0039	--	--	--	--
BENZENE	--	<.0001	--	--	<.0001	--	--	<.0001
FORMALDEHYDE	0.0035	--	--	0.0035	--	--	--	0.0035
PROPYLENE OXIDE	<.0001	--	--	<.0001	<.0001	--	--	--
TOLUENE	<.0001	--	<.0001	<.0001	<.0001	--	--	--
XYLENES	<.0001	--	--	<.0001	--	--	--	--
Total Acute	0.0251	<.0001	<.0001	0.0251	<.0001	--	--	0.0035

A Zero Background Concentration file was used to perform this analysis, therefore, there is no contribution from background pollutants.

California Air Resources Board

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Health Risk Assessment Program

Version 2.0e

CHRONIC INHALATION EXPOSURE REPORT

Run Made By

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Sierra Research

Project : SFPUC ERP

Feb. 18, 2004

Pollutant Database Date : Nov. 15, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.020E-06
ACETALDEHYDE	2.800E-04
ACROLEIN	2.540E-05
AMMONIA	9.380E-02
BENZENE	2.290E-05
ETHYL BENZENE	2.240E-04
FORMALDEHYDE	2.520E-03
N-HEXANE	1.780E-03
NAPHTHALENE	1.140E-05
PAH:BENZO(A)PYRENE	1.230E-06
PROPYLENE (PROPENE)	5.300E-03
PROPYLENE OXIDE	2.030E-04
TOLUENE	9.140E-04
XYLENES	4.490E-04

CHRONIC INHALATION HAZARD INDEX

Pollutant	Resp	CV/BL	CNS	Skin	Repro	Kidn	GI/LV	Immun
1,3-BUTADIENE	--	--	--	--	<.0001	--	--	--
ACETALDEHYDE	<.0001	--	--	--	--	--	--	--
ACROLEIN	0.0004	--	--	0.0004	--	--	--	--
AMMONIA	0.0005	--	--	--	--	--	--	--
BENZENE	--	<.0001	<.0001	--	<.0001	--	--	--
ETHYL BENZENE	--	--	--	--	<.0001	<.0001	<.0001	--
FORMALDEHYDE	0.0008	--	--	0.0008	--	--	--	--
N-HEXANE	--	--	<.0001	--	--	--	--	--
NAPHTHALENE	<.0001	--	--	--	--	--	--	--
PROPYLENE (PROP	<.0001	--	--	--	--	--	--	--
PROPYLENE OXIDE	<.0001	--	--	--	--	--	--	--
TOLUENE	<.0001	--	<.0001	--	<.0001	--	--	--
XYLENES	<.0001	--	<.0001	--	--	--	--	--
Total Chronic	0.0018	<.0001	<.0001	0.0013	<.0001	<.0001	<.0001	--

A Zero Background Concentration file was used

to perform this analysis, therefore, there is no contribution from background pollutants.

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Health Risk Assessment Program

Version 2.0e

CHRONIC NONINHALATION EXPOSURE REPORT

Run Made By

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Sierra Research

Project : SFPUC ERP

Feb. 18, 2004

Pollutant Database Date : Nov. 15, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.020E-06
ACETALDEHYDE	2.800E-04
ACROLEIN	2.540E-05
AMMONIA	9.380E-02
BENZENE	2.290E-05
ETHYL BENZENE	2.240E-04
FORMALDEHYDE	2.520E-03
N-HEXANE	1.780E-03
NAPHTHALENE	1.140E-05
PAH:BENZO(A)PYRENE	1.230E-06
PROPYLENE (PROPENE)	5.300E-03
PROPYLENE OXIDE	2.030E-04
TOLUENE	9.140E-04
XYLENES	4.490E-04

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

```
Deposition Velocity (m/s) .....:  0.020

Fraction of Homegrown Produce .:  0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....:   0.0000
Fraction of Animals' Diet From Grazing ..............:   0.0000
Fraction of Animals' Diet From Impacted Feed ........:   0.0000

Fraction of Animals' Water Impacted by Deposition ...:   0.0000

  Surface Area (m2) ....:  0.000E+00
  Volume (liters) ......:  0.000E+00
  Volume Changes .......:  0.000E+00


Fraction of Meat in Diet Impacted ..: 0.0000

  Beef ................: 0.0000
  Pork ................: 0.0000
  Lamb/Goat ...........: 0.0000
  Chicken .............: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

  Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000


Fraction of Impacted Drinking Water : 0.0000

  X/Q at water source ..:     0.0000
  Surface Area (m2) ....:  0.000E+00
  Volume (liters) ......:  0.000E+00
  Volume changes .......:  0.000E+00


Fraction of Fish from Impacted Water: 0.0000

  X/Q at Fish Source ...:     0.0000
  Surface Area (m2) ....:  0.000E+00
  Volume (liters) ......:  0.000E+00
  Volume changes .......:  0.000E+00
```

CHRONIC NONINHALATION EXPOSURE

Pollutant	Avg. Dose (mg/kg-d)	REL (mg/kg-d)	Avg Dose/REL
1,3-BUTADIENE	---	---	---
ACETALDEHYDE	---	---	---
ACROLEIN	---	---	---
AMMONIA	---	---	---
BENZENE	---	---	---
ETHYL BENZENE	---	---	---
FORMALDEHYDE	---	---	---
N-HEXANE	---	---	---
NAPHTHALENE	4.88E-09	---	---
PAH:BENZO(A)PYRENE	2.76E-10	---	---
PROPYLENE (PROPENE)	---	---	---
PROPYLENE OXIDE	---	---	---
TOLUENE	---	---	---
XYLENES	---	---	---

California Air Resources Board

And

Office of Environmental Health Hazard Assessment

Health Risk Assessment Program

Version 2.0e

INDIVIDUAL CANCER RISK REPORT

Run Made By

nlm

Sierra Research

Project : SFPUC ERP

Feb. 18, 2004

Pollutant Database Date : Nov. 15, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.020E-06
ACETALDEHYDE	2.800E-04
ACROLEIN	2.540E-05
AMMONIA	9.380E-02
BENZENE	2.290E-05
ETHYL BENZENE	2.240E-04
FORMALDEHYDE	2.520E-03
N-HEXANE	1.780E-03
NAPHTHALENE	1.140E-05
PAH:BENZO(A)PYRENE	1.230E-06
PROPYLENE (PROPENE)	5.300E-03
PROPYLENE OXIDE	2.030E-04
TOLUENE	9.140E-04
XYLENES	4.490E-04

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

```
Deposition Velocity (m/s) .....:  0.020

Fraction of Homegrown Produce .:  0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....:   0.0000
Fraction of Animals' Diet From Grazing ..............:   0.0000
Fraction of Animals' Diet From Impacted Feed ........:   0.0000

Fraction of Animals' Water Impacted by Deposition ...:   0.0000

    Surface Area (m2) ....:  0.000E+00
    Volume (liters) ......:  0.000E+00
    Volume Changes .......:  0.000E+00


Fraction of Meat in Diet Impacted ..: 0.0000

    Beef ................: 0.0000
    Pork ................: 0.0000
    Lamb/Goat ...........: 0.0000
    Chicken .............: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

    Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000


Fraction of Impacted Drinking Water : 0.0000

    X/Q at water source ..:      0.0000
    Surface Area (m2) ....:   0.000E+00
    Volume (liters) ......:   0.000E+00
    Volume changes .......:   0.000E+00


Fraction of Fish from Impacted Water: 0.0000

    X/Q at Fish Source ...:      0.0000
    Surface Area (m2) ....:   0.000E+00
    Volume (liters) ......:   0.000E+00
    Volume changes .......:   0.000E+00
```

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44 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	3.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	4.75E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BENZENE	4.17E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	9.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(A)PYR	8.50E-10	1.31E-09	8.31E-10	0.00E+00	3.35E-09	0.00E+00
PROPYLENE OXIDE	4.72E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	1.20E-08	1.31E-09	8.31E-10	0.00E+00	3.35E-09	0.00E+00

TOTAL RISK: 1.75E-08

70 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	5.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	7.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BENZENE	6.64E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	1.51E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(A)PYR	1.35E-09	2.03E-09	1.29E-09	0.00E+00	0.00E+00	0.00E+00
PROPYLENE OXIDE	7.51E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	1.92E-08	2.03E-09	1.29E-09	0.00E+00	0.00E+00	0.00E+00

TOTAL RISK: 2.25E-08

APPENDIX 8.1D

Construction Emissions and Impact Analysis

APPENDIX 8.1D

CONSTRUCTION EMISSIONS AND IMPACT ANALYSIS

8.1D-1 Onsite Construction

Construction of the project is expected to last approximately 17 months, including 5 months for demolition and site preparation and 12 months for construction. Construction activities will occur in the following four main phases:

- Site preparation and water pipeline construction;
- Foundation work;
- Installation of major equipment; and
- Construction/installation of major structures.

Site preparation includes clearing, grading, excavation of footings and foundations, and backfilling operations. Construction of the water pipeline will occur during the site preparation/demolition phase of onsite construction. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

Fugitive dust emissions from the construction of the project will result from:

- Dust entrained during site preparation and grading/excavation at the construction site;
- Dust entrained during trenching and repaving activities along the water pipeline route;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from the Diesel excavator, paver, and trucks associated with water pipeline construction;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines, electric generators, air compressors, and water pumps;
- Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and

- Exhaust from automobiles used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Because of the staggered construction schedule, site preparation and equipment installation may be occurring simultaneously. Therefore, maximum short-term impacts are calculated assuming that all equipment is operating simultaneously with the peak workforce (250 persons) on-site. Annual emissions are based on the average equipment mix during the 17-month construction/demolition period.

8.1D-2 Linear Facilities

Offsite construction will include a natural gas pipeline and process water line. Emissions from these construction activities are included in this analysis.

8.1D-3 Available Mitigation Measures

The following mitigation measures are proposed to control exhaust emissions from the Diesel heavy equipment used during construction of the project:

- Operational measures, such as limiting time spent with the engine idling by shutting down equipment when not in use;
- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle Diesel fuel; and
- Use of low-emitting Diesel engines meeting federal emissions standards for construction equipment.

The following mitigation measures are proposed to control fugitive dust emissions during construction of the project:

- Use either water application or chemical dust suppressant application to control dust emissions from unpaved road travel and unpaved parking areas;
- Use vacuum sweeping and/or water flushing of paved road surface to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard;
- Limit traffic speeds on unpaved roads to 15 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Replant vegetation in disturbed areas as quickly as possible;
- Use wheel washers or wash off tires of all trucks exiting construction site that carry track-out dirt from unpaved roads; and

- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant.

8.1D-4 Estimation of Emissions with Mitigation Measures

8.1D-4.1 Onsite Construction

Tables 8.1D-1 and 8.1D-2 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for onsite construction activities. Detailed emission calculations are included as Attachment 8.1D-1.

Table 8.1D-1

Maximum Daily Emissions During Onsite Construction, Pounds Per Day

	NOx	CO	POC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Construction Equipment	53.0	33.2	6.4	0.06	3.7	3.7
Fugitive Dust	--	--	--	--	16.7	5.1
Offsite						
Worker Travel, Truck Deliveries	86.5	253.9	26.4	0.9	2.4	2.4
Total Emissions						
Total	139.5	287.1	32.8	0.9	22.9	11.2

Table 8.1D-2

Annual Emissions During Construction, Tons Per Year

	NOx	CO	POC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Construction Equipment	5.6	3.4	0.6	0.01	0.4	0.4
Fugitive Dust	--	--	--	--	1.5	0.5
Offsite						
Worker Travel, Truck Deliveries	4.6	18.0	1.8	0.04	0.1	0.1
Total Emissions						
Total	10.2	21.4	2.5	0.05	2.0	1.0

8.1D-4.2 Linear Facilities Construction

The estimated maximum daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for the natural gas pipeline construction activities are included in the onsite construction analysis. Table 8.1D-3 shows the estimated maximum daily equipment exhaust and fugitive dust emissions with mitigation during water pipeline construction. Detailed emissions calculations are shown in Attachment 8.1D-1.

Table 8.1D-3
Maximum Daily Emissions During Water Pipeline Construction, Pounds Per Day

	NOx	CO	POC	SOx	PM_{10}	$PM_{2.5}$
Construction Equipment	17.3	7.6	1.3	0.06	0.7	0.7
Fugitive Dust	--	--	--	--	0.4	0.08
Worker Travel, Truck Deliveries	18.7	23.0	2.6	0.2	0.4	0.4
Total Emissions						
Total	36.0	30.1	3.9	0.3	1.6	1.2

8.1D-5 Analysis of Ambient Impacts from Onsite Construction

Ambient air quality impacts from emissions during construction of the project were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

8.1D-5.1 Existing Ambient Levels

As with the modeling analysis of project operating impacts (Section 8.1.2), the Arkansas Street (San Francisco) monitoring station was used to establish the ambient background levels for the construction impact modeling analysis. Table 8.1-4.3 shows the maximum concentrations of NOx, SO_2, CO, and PM_{10} recorded for 2000 through 2002 at that monitoring station.

8.1D-5.2 Dispersion Model

As in the analysis of project operating impacts, the EPA-approved Industrial Source Complex Short Term (ISCST3) model was used to estimate ambient impacts from construction activities. A detailed discussion of the ISCST3 dispersion model is included in Section 8.1.5.3.1.

The emission sources for the construction site were grouped into three categories: exhaust emissions, construction dust emissions and windblown dust emissions. The exhaust and construction dust emissions were modeled as volume sources. The windblown dust emissions were modeled as area sources. For the volume sources, the vertical dimension was set to 6 meters. For combustion sources in the construction area, the horizontal dimension was set to 154.58 meters, with sigma-y = 35.95 meters (based on the width of the construction area). For combustion sources in the construction laydown area, the horizontal dimension was set to 209.78 meters, with sigma-y = 48.79 meters (corresponding to the width of the laydown area).

For the windblown dust sources, the area covers the entire site plan. An effective plume height of 0.5 meters was used in the modeling analysis. The exhaust and dust emissions were modeled as a single area source that covered the total area of the construction site. The construction impacts modeling analysis used the same receptor locations as used for

the project operating impact analysis. A detailed discussion of the receptor locations is included in Section 8.1.5.3.1.

To determine the construction impacts on short-term ambient standards (24 hours and less), the worst-case daily onsite construction emission levels shown in Table 8.1D-1 were used. For pollutants with annual average ambient standards, the annual onsite emission levels shown in Table 8.1D-2 were used. As with the project operating impact analysis, the meteorological data set used for the construction emission impacts analysis is the ambient data collected at the nearby Arkansas Street monitoring station between 2000 and 2002.

8.1D-4.5.3 Modeling Results

Based on the emission rates of NOx, SO_2, CO, and PM_{10} and the meteorological data, the ISCST3 model calculates hourly and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour, 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NOx, SO_2, CO, and PM_{10}. The annual impacts are based on the annual emission rates of these pollutants.

The one-hour and annual average concentrations of NO_2 were computed following the revised EPA guidance for computing these concentrations (August 9, 1995 *Federal Register*, 60 FR 40465). The ISC_OLM model was used for the one-hour average NO_2 impacts; uncorrected one-hour impacts are also reported for comparison. The annual average was calculated using the ambient ratio method (ARM) with the national default value of 0.75 for the annual average NO_2/NOx ratio.

The modeling analysis results are shown in Table 8.1D-4. Also included in the table are the maximum background levels that have occurred in the last 3 years and the resulting total ambient impacts. Construction impacts alone for all modeled pollutants are expected to be below the most stringent state and national standards. With the exception of the 24-hour and annual average PM_{10}, construction activities are not expected to cause the violation of any state or federal ambient air quality standard. However, the state 24-hour and annual average PM_{10} standards are exceeded in the absence of the construction emissions for the project.

The dust mitigation measures already proposed by the applicant are expected to be very effective in minimizing fugitive dust emissions. The attached isopleth diagrams show the extent of the modeled impacts from construction PM_{10} and $PM_{2.5}$ for the 24-hour and annual averaging periods.

Table 8.1D-4
Modeled Maximum Onsite Construction Impacts

Pollutant	Averaging Time	Maximum Construction Impacts (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	Standard (µg/m³)	Federal Standard (µg/m³)
NO_2[a]	1-hour	89.6	141	231	470	--
	Annual	2.1	38	40	--	100
SO_2	1-hour	0.3	138	138	650	--
	24-hour	0.04	21	21	109	365
	Annual	0.03	5.3	5.3	--	80
CO	1-hour	154.2	6,875	7,029	23,000	40,000
	8-hour	63.2	3,644	3,707	10,000	10,000
PM_{10}	24-hour	14.9	74	89	50	150
	Annual	1.3	24.7	26	20	50
$PM_{2.5}$	24-hour	6.4	77	83	--	65
	Annual	0.6	13.1	14	12	15

Notes:
a. Ozone limiting method applied for 1-hour average, using concurrent O_3 data (1992). ARM applied for annual average, using national default 0.75 ratio. Uncorrected 1-hour NOx concentration is 246 µg/m³.

As shown on these isopleths, while maximum impacts occur next to the project site fenceline, concentrations decrease rapidly at locations only a couple of hundred meters away from the project site. For example, as shown on the isopleths for 24-hour average PM_{10} impacts, along the fenceline PM_{10} impacts are approximately 15 µg/m³. However, at locations only 500 meters away from the fenceline PM_{10} impacts decrease to less than 2 µg/m³ (approximately 10% of the level at the fenceline).

It is also important to note that emissions in an exhaust plume are dispersed through the entrainment of ambient air, which dilutes the concentration of the emissions as they are carried away from the source by winds. The process of mixing the pollutants with greater and greater volumes of cleaner air is controlled primarily by the turbulence in the atmosphere. This dispersion occurs both horizontally, as the exhaust plume rises above the emission point, and vertically, as winds carry the plume horizontally away from its source.

The rise of a plume above its initial point of release is a significant contributing factor to the reductions in ground-level concentrations, both because a rising plume entrains more ambient air as it travels downwind, and because it travels farther downwind (and thus also undergoes more horizontal dispersion) before it impacts the ground. Vertical plume rise occurs as a result of buoyancy (plume is hotter than ambient air, and hot air, being less dense, tends to rise) and/or momentum (plume has an initial vertical velocity).
In ISCST3, area sources are not considered to have either buoyant or momentum plume rise, and therefore the model assumes that there is no vertical dispersion taking place. Thus a significant source of plume dilution is ignored when sources are modeled as area sources. The project construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards. The input and output modeling files are being provided electronically.

8.1D-5.4 Health Risk of Diesel Exhaust

The combustion portion of annual PM_{10} emissions from Table 8.1D-4 above was modeled separately to determine the annual average Diesel PM_{10} exhaust concentration. This was used with the ARB-approved unit risk value of 350 in one million for a 70-year lifetime[1] to determine the potential carcinogenic risk from Diesel exhaust during construction. The exposure was also adjusted by a factor of 17/840, or 0.0202, to correct for the 17-month exposure.

The maximum modeled annual average concentration of Diesel exhaust PM_{10} at any location is 0.175 µg/m³. Using the unit risk value and adjustment factors described above, the carcinogenic risk due to exposure to Diesel exhaust during construction activities is expected to be approximately 1.2 in one million. This is well below the 10 in one million level considered to be significant.

It is also important to note that these impacts are highly localized near the project site. At the nearest residence the annual average concentration of Diesel exhaust PM_{10} is approximately 0.01 µg/m³ resulting in a carcinogenic risk of approximately 0.06 in one million. As shown in the attached annual average Diesel combustion PM_{10} isopleth diagram (Figure 8.1D-3), the area in which the risk may exceed 1 in one million (Diesel PM_{10} impact greater than or equal to 0.141 µg/m³) extends about only about 100 meters from the facility fenceline. This analysis remains conservative because, as discussed above, the modeled PM_{10} concentrations from construction operations are overpredicted by the ISCST3 model.

[1] For a single-point assessment of cancer risk at residential receptors, an interim policy issued by CARB recommends that the cancer risk be calculated using the midpoint (80th percentile) breathing rate of the mean (65th percentile) and the high-end (95th percentile) from the OEHHA guidelines. Thus, a breathing rate of 332 L/kg-day (midpoint of 271 and 393 L/kg-day) is used in this assessment to calculate the maximum offsite cancer risk. The basis for the Unit Risk Value is a standard breathing rate of 30 m³/day, which is equivalent to 286 L/kg-day (at an average weight of 70 kg). Thus the Unit Risk Value for Diesel goes from 300 in one million to 350 in one million (300 x 332/286).

Figure 8.1D-1

Maximum One-Hour Average NO_2 Impacts During Construction Activities (Ozone-Limited)

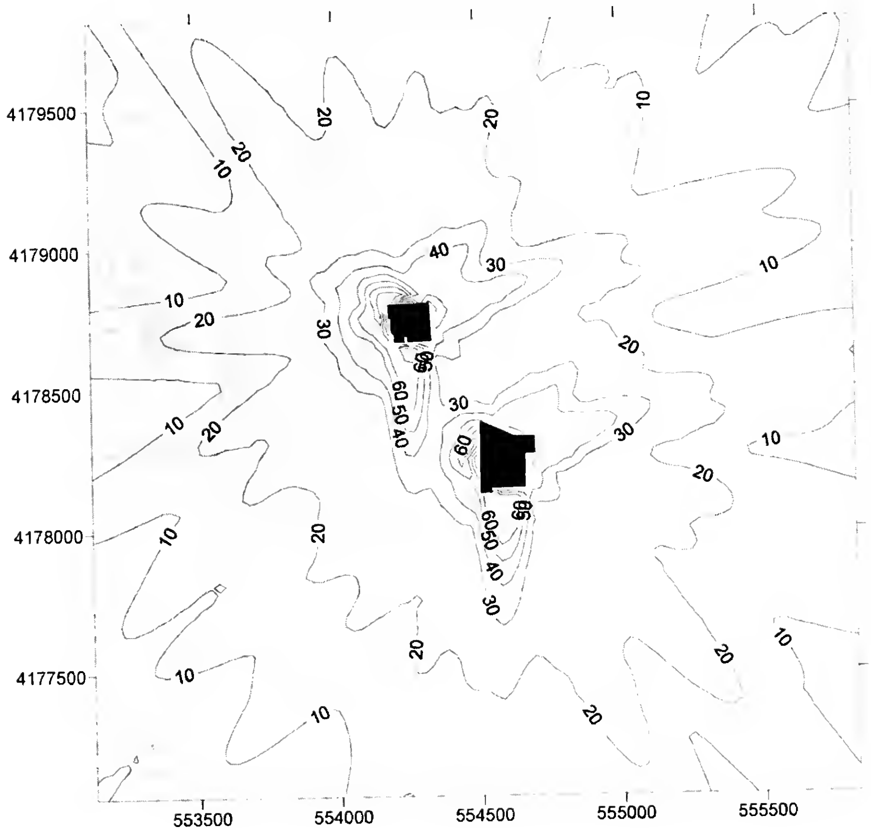


Figure 8.1D-2

Maximum 24-Hour Average PM_{10} Impacts During Construction Activities, All Sources

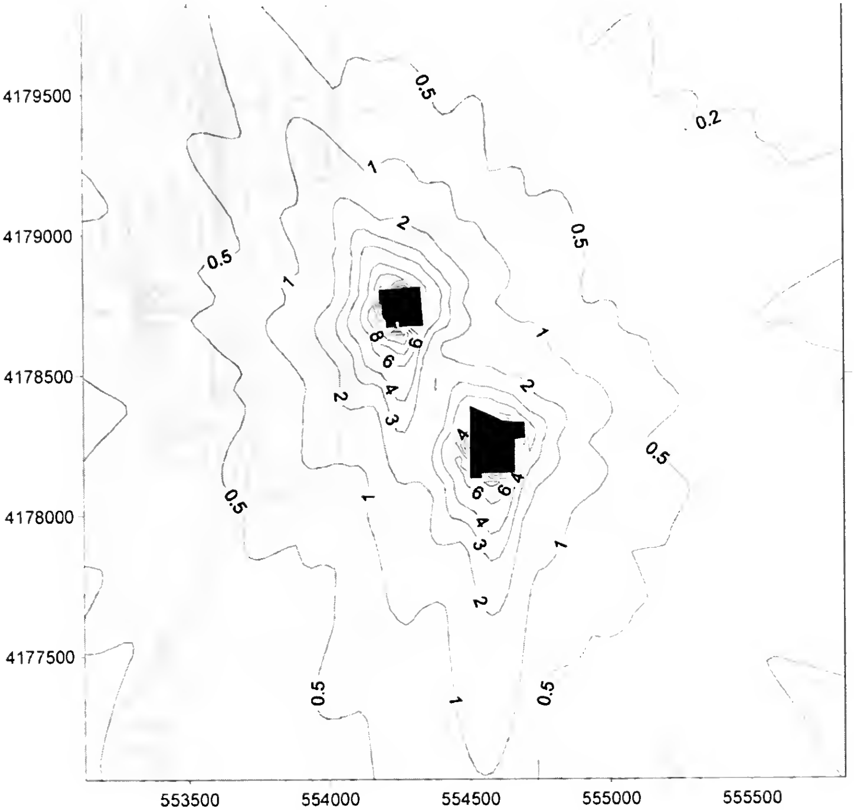


Figure 8.1D-3a

Maximum Annual Average PM_{10} Impacts During Construction Activities, Combustion Sources

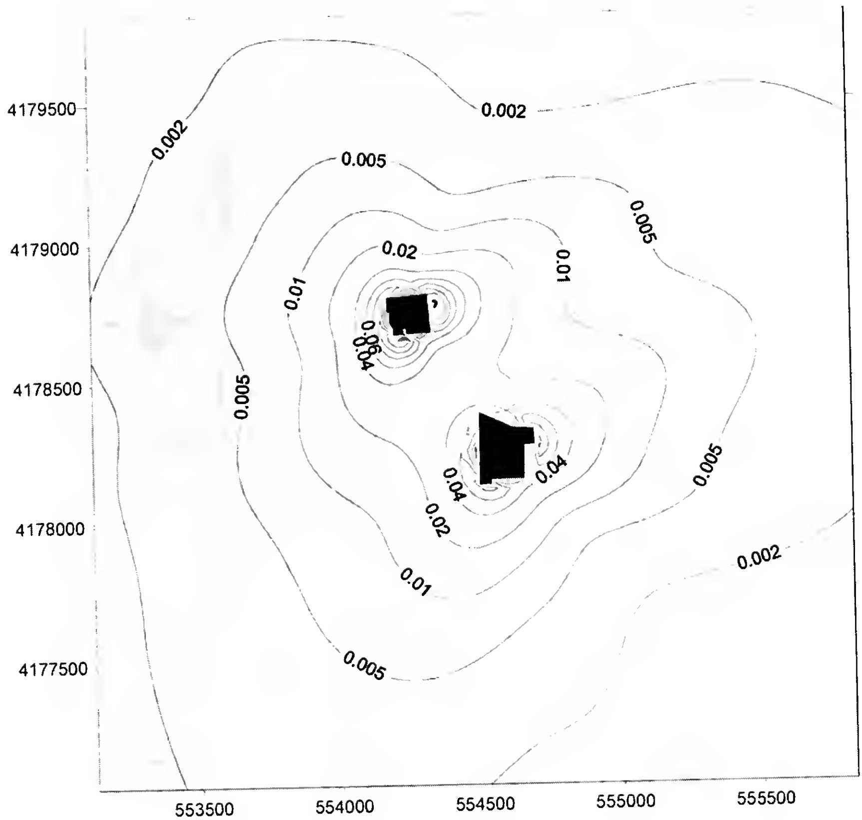


Figure 8.1D-3b

Maximum Annual Average PM_{10} Impacts During Construction Activities, Combustion Sources (detail)

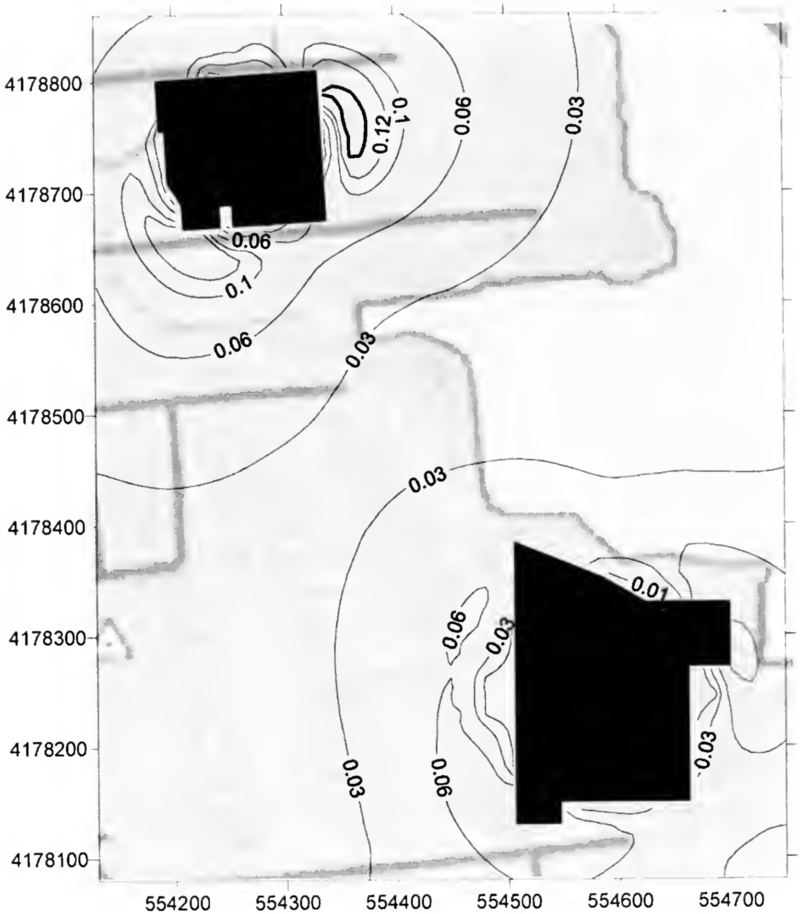
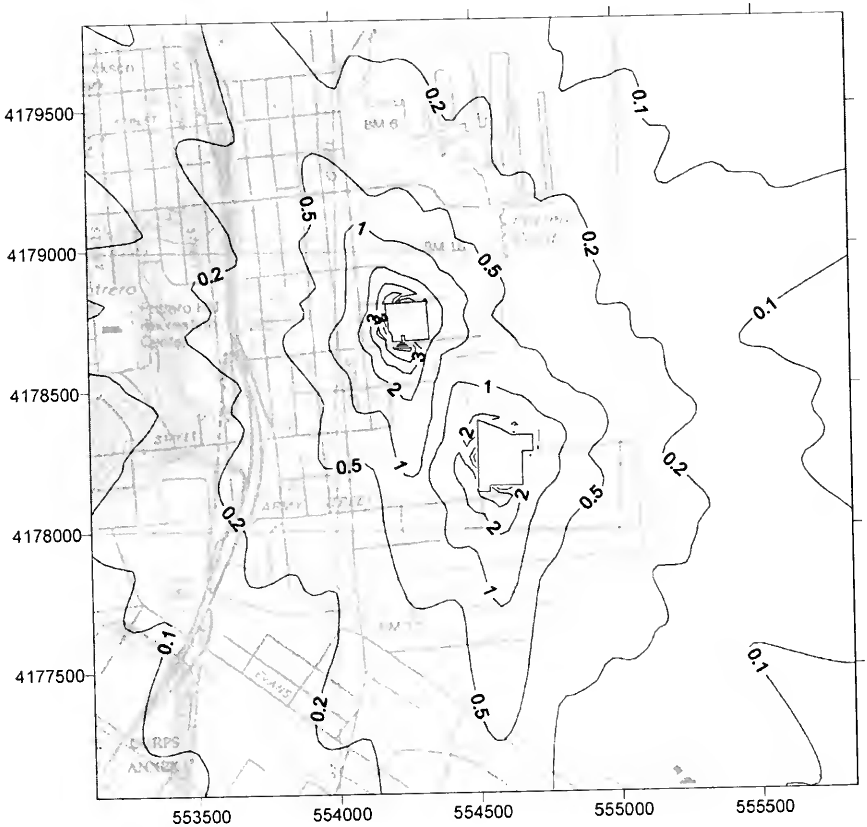


Figure 8.1D-4

Maximum 24-Hour Average PM_{10} Impacts During Construction Activities, All Sources



Attachment 8.1D-1 Detailed Construction Emissions Calculations

Daily Construction Emissions (peak months) (lbs/day)						
	NOx	CO	VOC	SOx	PM2.5	PM10
Onsite						
Construction Equipment	53.00	33.23	6.42	0.06	3.73	3.73
Fugitive Dust					5.06	16.73
Subtotal =	53.00	33.23	6.42	0.06	8.79	20.47
Offsite						
Worker Travel	21.99	216.95	21.56	0.12	1.03	1.03
Truck Deliveries	64.49	36.92	4.81	0.75	1.39	1.39
Subtotal =	86.48	253.87	26.37	0.87	2.42	2.42
Total =	139.48	287.10	32.79	0.93	11.21	22.89

Annual Construction Emissions (peak 12-month period) (tons/yr)						
	NOx	CO	VOC	SOx	PM2.5	PM10
Onsite						
Construction Equipment	5.55	3.40	0.63	0.01	0.35	0.35
Fugitive Dust					0.46	1.50
Subtotal =	5.55	3.40	0.63	0.01	0.81	1.85
Offsite						
Worker Travel	1.65	16.32	1.62	0.01	0.08	0.08
Truck Deliveries	2.98	1.70	0.22	0.03	0.06	0.06
Subtotal =	4.63	18.03	1.84	0.04	0.14	0.14
Total =	10.19	21.43	2.47	0.05	0.95	1.99

Dust Emission Ranking

Equipment	Hrs/Day Per Unit (1)	PM10 lbs/hr Per Unit	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17
Grader	7	0.06	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dozer	7	0.42	0.00	0.00	0.00	0.00	0.00	2.94	2.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper	7	0.83	0.00	0.00	0.00	0.00	0.00	5.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift	7	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	3.81	3.81	3.81	3.81	3.81	3.81	3.81	2.54	0.00
Backhoe	7	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.99	3.99	3.99	3.99	3.99	3.99	3.99	2.66	0.00	0.00
Crane	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader	7	0.04	0.53	0.53	0.79	0.79	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field truck (3/4T)	7	0.13	0.00	0.00	0.00	0.00	0.00	0.88	0.88	0.88	0.88	0.88	1.76	1.76	1.76	1.76	0.88	0.88	0.88
Wrecking Ball	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dump truck	7	0.19	5.43	5.43	5.43	5.43	5.43	1.36	1.36	1.36	2.71	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water truck	7	0.30	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service truck	7	0.09	0.00	0.00	0.00	5.70	0.00	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.00	0.00	0.00
Fuel Truck	7	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00
Boom truck	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port air compressor	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port. Light plant	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total =	1	1	1	1	1	10	4	7	9	9	10	10	10	10	7	3	1
			5%	5%	8%	8%	8%	100%	42%	66%	86%	86%	95%	95%	95%	95%	73%	34%	9%
		12-month Total =												61	70	79	85	88	88

Note (1) 7 hours of equipment operation during 10 hrs/day of construction activity

Daily Fugitive Dust Emissions (peak months)

Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM2.5 Emission Factor(1) (lbs/unit)	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM2.5 Emissions (lbs/day)	PM10 Emissions (lbs/day)
Backhoe	0	882.0	0.0	tons	5.305E-05	0.0015	0%	0.00	0.00
Grader	1	21.0	21.0	vmt	0.0193297	0.2754	92%	0.03	0.45
Dozer	1	7.0	7.0	hr	0.23	0.4194	0%	1.62	2.94
Scraper - Excavation	1	7.0	7.0	hr	0.23	0.4194	0%	1.62	2.94
Scraper - Unpaved Road Travel	1	10.6	10.6	vmt	0.53	3.4638	92%	0.44	2.86
Loader - Excavation	0	735.0	0.0	tons	2.827E-05	0.0001	0%	0.00	0.00
Loader - Unpaved Road Travel	0	1.3	0.0	vmt	0.29	1.9201	92%	0.00	0.00
Water Truck Unpaved Road Travel	1	9.5	9.5	vmt	0.44	2.8400	92%	0.32	2.11
Forklift Unpaved Road Travel	0	9.5	0.0	vmt	0.26	1.7100	92%	0.00	0.00
Dump Truck Unpaved Road Travel	1	5.6	5.6	vmt	0.46	2.9806	92%	0.20	1.29
Dump Truck Unloading	1	735.0	735.0	tons	2.827E-05	0.0001	0%	0.02	0.07
3/4 ton Truck Unpaved Road Travel	1	11.4	11.4	vmt	0.15	0.9947	92%	0.13	0.88
3 ton Truck Unpaved Road Travel	1	5.7	5.7	vmt	0.22	1.4328	92%	0.10	0.63
Fuel Truck Unpaved Road Travel	1	0.1	0.1	vmt	0.33	2.1349	92%	0.00	0.02
Windblown Dust (active construction area)	N/A	573,830.8	573,830.8	sq.ft.	6.728E-06	1.682E-05	92%	0.30	0.75
Worker Gravel Road Travel	192	0.1	21.9	vmt	0.12	0.7705	92%	0.20	1.31
Delivery Truck Gravel Road Travel	13	0.1	1.5	vmt	0.35	2.3088	92%	0.04	0.27
Delivery Truck Unpaved Road Travel	13	0.1	1.0	vmt	0.46	2.9806	92%	0.04	0.23
Total =								5.06	16.73

Notes:
(1) See notes for fugitive dust emission calculations.

Annual Fugitive Dust Emissions

Activity	Average Daily PM2.5 Emissions(1) (lbs/day)	Average Daily PM10 Emissions(1) (lbs/day)	Days per Year	Annual PM2.5 Emissions (tons/yr)	Annual PM10 Emissions (tons/yr)
Construction Activities	3.47	11.67	240	0.42	1.40
Windblown Dust	0.22	0.55	365	0.04	0.10
Total =				0.46	1.50

Notes:
(1) Based on average of daily emissions during peak 12-month construction period.

Notes - Fugitive Dust Emission Calculations

Wind erosion of active construction area - 'Source: "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996

Level 2 Emission Factor =	0.011	ton/acre-month
Construction Schedule =	30	days/month
=	0.7	lbs/acre-day
=	1.682E-05	PM10 lbs/scf-day
	6.728E-06	PM2.5 lbs/scf-day

Material Unloading - Source: AP-42, p. 13.2.4-3, 1/95

E = (k)(0.0032)[(U/5)^1.3]/[(M/2)^1.4]

k = particle size constant =	0.35	for PM10
k = particle size constant =	0.11	for PM2.5
U = average wind speed =	2.81	m/sec (based on project area wind data)
=	6.29	mph
M = moisture content =	15.0%	(SCAQMD CEQA Handbook, Table A9-9-G-1, moist soil)
E = PM10 emission factor =	0.0001	lb/ton
E = PM2.5 emission factor =	0.00003	lb/ton

Loader Unpaved Road Travel - Source: AP-42, Section 13.2.2, 12/03

E = (k)[(s/12)^0.9][(W/3)^0.45]

k = particle size constant =	1.5	for PM10
k = particle size constant =	0.23	for PM2.5
s = surface silt content =	8.50	(AP-42, Table 13.2.2-1, 12/03, construction haul route)
W = avg. vehicle weight =	10.35	tons (avg. of loaded and unloaded weights, 966F loader, Caterpillar Performance Handbook, 10/97)
E = PM10 emission factor =	1.92	lb PM10/VMT
E = PM2.5 emission factor =	0.29	lb PM2.5/VMT
Soil Density =	1.05	ton/yd3 (Caterpillar Performance Handbook, 10/89)
Loader Bucket Capacity =	5	yd3 (966F loader, Caterpillar Performance Handbook, 10/97)
=	5.25	ton/load
Daily Soil Transfer Rate =	735	ton/day (operating 7 hrs/day)
Daily Loader Trips =	140	loading trips/day
Loading Travel Distance =	50	ft/load (estimated)
Daily Loader Travel Distance =	7,000	ft/day
=	1.3	mi/day

Notes - Fugitive Dust Emission Calculations

Backhoe Trenching - Source: AP-42, Table 11.9-1 (dragline operations), 7/98

E = (0.75)(0.0021)(d^0.7)/(M^0.3)

d = drop height =	3 ft (estimated)
M = moisture content =	15.0% (SCAQMD CEQA Handbook, Table A9-9-G-1, moist soil)
E = PM10 emission factor =	0.0015 PM10 lb/ton
E = PM2.5 emission factor =	0.0001 PM2.5 lb/ton
Backhoe Excavating Rate =	120.0 yd3/hr (based on 1 yd3 bucket on a 416C backhoe and a 30 sec Cycle time)
=	840 yd3/day for 1 backhoe @ 7 hrs/day of operation
Soil Density =	1.0500 ton/yd3 (Caterpillar Performance Handbook, 10/89)
Daily Soil Transfer Rate =	882.0000 ton/day (estimated)

Unpaved Road Travel - Source: AP-42, Section 13.2.2, 12/03.

E = (k)[(s/12)^0.9*(W/3)^0.45

k = particle size constant =	1.5 for PM10
k = particle size constant =	0.23 for PM2.5
s = silt fraction =	8.50 (AP-42, Table 13.2.2-1, 12/03, constructic
W = water truck avg. veh. weight =	10.0 tons empty (estimated)
=	39.4 tons loaded (estimated with 8,000 gallon water capacity)
=	24.7 tons average
W = dump truck avg veh. weight =	15.0 tons (for heavy duty Diesel trucks)
=	40.0 tons (for heavy duty Diesel trucks)
=	27.5 tons (for heavy duty Diesel trucks)
W = forklift avg. veh. weight =	8.0 tons empty (estimated)
W = auto/pickup avg. vehicle weight =	2.4 tons (CARB Area Source Manual, 9/97)
W = delivery truck avg. veh. wt. =	27.5 tons (for heavy duty Diesel trucks)
W = 3 ton truck avg. veh. Wt =	5.4 tons (estimate)
W = scraper avg. veh. wt. =	28.2 tons empty (615 scraper, Caterpillar Performance Handbook, 10/89)
	48.6 tons loaded (615 scraper, Caterpillar Performance Handbook, 10/89)
	38.4 tons mean weight
W = fuel truck avg. veh. weight =	8.0 tons empty (estimated)
=	18.2 tons loaded (estimated with 3,000 gallons Diesel fuel capacity)
=	13.1 tons average

Gravel Road Travel - Source: AP-42, Section 13.2.2, 12/03.

E = (k)[(s/12)^0.9*(W/3)^0.45

k = particle size constant =	1.5 for PM10
k = particle size constant =	0.23 for PM2.5
s = silt fraction =	6.40 (AP-42, Table 13.2.2-1, 12/03, gravel road)
W = water truck avg. veh. weight =	10.0 tons empty (estimated)
=	39.4 tons loaded (estimated with 8,000 gallon water capacity)
=	24.7 tons average
W = dump truck avg. veh. weight =	15.0 tons (for heavy duty Diesel trucks)
=	40.0 tons (for heavy duty Diesel trucks)
=	27.5 tons (for heavy duty Diesel trucks)
W = forklift avg. veh. weight =	8.0 tons empty (estimated)
W = auto/pickup avg. vehicle weight =	2.4 tons (CARB Area Source Manual, 9/97)
W = delivery truck avg. veh. wt. =	27.5 tons (for heavy duty Diesel trucks)

Notes - Fugitive Dust Emission Calculations

E = water truck emission factor =	2.84 lb PM10/VMT
E = dump truck emission factor =	2.98 lb PM10/VMT
E = forklift emiss. factor =	1.71 lb PM10/VMT
E = auto/pickup emiss. factor =	0.99 lb PM10/VMT
E = delivery truck emiss. factor =	2.98 lb PM10/VMT
E = 3-ton truck emiss. factor =	1.43 lb PM10/VMT
E = scaper emiss. factor =	3.46 lb PM10/VMT
E = fuel truck emiss. factor =	2.13 lb PM10/VMT
E = water truck emission factor =	0.44 lb PM2.5/VMT
E = dump truck emission factor =	0.46 lb PM2.5/VMT
E = forklift emiss. factor =	0.26 lb PM2.5/VMT
E = auto/pickup emiss. factor =	0.15 lb PM2.5/VMT
E = delivery truck emiss. factor =	0.46 lb PM2.5/VMT
E = 3-ton truck emiss. factor =	0.22 lb PM2.5/VMT
E = scaper emiss. factor =	0.53 lb PM2.5/VMT
E = fuel truck emiss. factor =	0.33 lb PM2.5/VMT

E = auto/pickup emiss. factor =	0.77 lb PM10/VMT
E = delivery truck emiss. factor =	2.31 lb PM10/VMT
E = auto/pickup emiss. factor =	0.12 lb PM2.5/VMT
E = delivery truck emiss. factor =	0.35 lb PM2.5/VMT

Unpaved Road Travel and Active Excavation Area Control - Source: Control of Open Fugitive Dust Sources, U.S EPA, 9/88

C = 100 - (0.8)(p)(d)(t)/(i)

p = potential average hourly daytime	
evaporation rate =	0.3575 mm/hr (EPA document, Figure 3-2, summer)
evaporation rate =	0.2695 mm/hr (EPA document, Figure 3-2, annual)
d = average hourly daytime traffic rate =	37.0 vehicles/hr (estimated)
t = time between watering applications =	1.00 hr/application (estimated)
i = application intensity =	1.4 L/m2 (typical level in EPA document, page 3-23)
C = average summer watering control efficien	92.2%
C = average annual watering control efficiency	94.1%

Finish Grading - Source: AP-42, Table 11.9-1, 7/98

E = (0.60)(0.051)(S^2.0)

S = mean vehicle speed =	3.0 mph (estimate)
E = emission factor =	0.2754 PM10 lb/VMT
E = emission factor =	0.0193 PM2.5 lb/VMT

Notes - Fugitive Dust Emission Calculations

Bulldozer Operation and Scraper Excavation - Source: AP-42, Table 11.9.1, 7/98

E = (0.75)(s^1.5)/(M^1.4)

s = silt content =	8.5% (AP-42, Table 13.2.2-1, 9/98, construction haul route)
M = moisture content =	15.0% (SCAQMD CEQA Handbook, Table A9-9-G-1)
E = emission factor =	0.42 PM10 lb/hr
E = emission factor =	0.23 PM2.5 lb/hr

Scraper Travel

W = mean vehicle weight =	28.2 tons empty (615E scraper, Caterpillar Performance Handbook, 10/89)
=	48.6 tons loaded (615E scraper, Caterpillar Performance Handbook, 10/89)
=	38.4 tons mean weight
Daily Scraper Haul Tonnage =	1,428 ton/day (estimated)
Scraper Load =	20.4 ton (615E scraper, Caterpillar Performance Handbook, 10/89)
Daily Scraper Loads =	70.00 loads/day
Daily Scraper Hauling Distance =	0.08 miles/load (estimated)
Daily Scraper Travel =	10.61 miles/day

Notes - Fugitive Dust Emission Calculations

(1) Wind erosion emission factor for active construction area is based on "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996.
(2) Material unloading emission factors are based on AP-42, p. 13.2.4-3, 1/95.
(Based on average annual wind speed recorded onsite and default soil moisture contents.)
(3) Trenching emission factor is based on AP-42, Table 11.9-2 (dragline operations), 1/95.
(Based on default soil moisture content.)
(4) Unpaved surface travel emission factors for water trucks, loaders, dump trucks, forklifts, delivery trucks, are based on AP-42, Section 13.2.2, 12/2003.
(Based on default soil silt content.)
(5) Dust control efficiency for unpaved road travel and active excavation area is based on "Control of Open Fugitive Dust Sources", U.S. EPA, 9/88.
(Based on default evaporation rate shown in EPA document, Figure 3-2, 9/88, and typical water application rate shown in EPA document, page 3-23, 9/88.)

Combustion Emission Ranking

Equipment	Hrs/Day Per Unit (1)	Gals/Hr Per Unit	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17
Grader	7	5.00	0	0	0	0	0	35	35	35	0	0	0	0	0	0	0	0	0
Dozer	7	5.50	0	0	0	0	0	39	39	0	0	0	0	0	0	0	0	0	0
Scraper	7	9 00	0	0	0	0	0	63	0	0	0	0	0	0	0	0	0	0	0
Forklift	7	2.50	0	0	0	0	0	0	0	18	53	53	53	53	53	53	53	35	0
Backhoe	7	2.50	0	0	0	0	0	0	0	53	53	53	53	53	53	53	35	0	0
Crane	7	5.00	0	0	0	0	0	0	0	35	35	70	70	70	70	35	0	0	0
Loader	7	2.50	35	35	53	53	53	0	0	0	0	0	0	0	0	0	0	0	0
Field truck (3/4T)	7	0.78	0	0	0	0	0	5	5	5	5	5	11	11	11	11	5	5	5
Wrecking Ball	7	5.00	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dump truck	7	3.13	88	88	88	88	88	22	22	22	44	44	0	0	0	0	0	0	0
Water truck	7	3.13	22	22	22	22	22	22	22	22	22	22	0	0	0	0	0	0	0
Service truck	7	1 56	0	0	0	98	0	11	11	11	11	11	11	11	11	11	0	0	0
Fuel Truck	7	3.13	0	0	0	0	0	22	22	22	22	22	22	22	22	22	22	0	0
Boom truck	7	1 56	0	0	0	0	0	0	0	0	11	11	11	11	11	11	11	0	0
Concrete pump	7	3 13	0	0	0	0	0	0	22	44	44	44	22	22	0	0	0	0	0
Port air compressor	7	1.27	0	0	0	0	0	9	9	9	9	9	9	9	9	9	9	0	0
Port. Light plant	7	1.27	0	0	0	0	0	9	9	9	9	9	9	9	9	9	9	0	0
		Total =	35	35	53	53	53	142	79	145	145	180	186	186	186	151	93	40	5
		12-month Total =												1292	1443	1558	1599	1587	1540

Note. (1) 7 hours of equipment operation during 10 hrs/day of construction activity.

Notes - Combustion Emissions

(1) For Construction Equipment
For Diesel construction equipment, emission factors based on equipment meeting EPA Tier I off-road Diesel standards and use of CARB ultra low-sulfur fuel.
For trucks, depending on size of truck, emissions factors based on EMFAC 2002 v.2.2 for heavy-heavy duty or medium duty Diesel trucks, fleet average for calendar year 2005

(2) For Delivery Trucks
From EMFAC 2002 V.2.2, heavy-heavy duty Diesel trucks, fleet average for calendar year 2005, San Francisco Air Basin.

(3) For Worker Travel
From EMFAC 2002 v 2.2, average of light duty automobiles and light duty trucks, fleet average for calendar year 2005.

	Emission Factors (1)				
	NOx	CO	VOC	SOx	PM10
Truck Hauling (lbs/vmt)	0.03543	0.02029	0.00264	0.00041	0.00077
Truck Hauling (lbs/1000 gals)	167.27418	95.77071	12.48315	1.93738	3.61512

Notes
(1) From EMFAC 2002 V 2.2, heavy-heavy duty Diesel trucks, fleet average for calendar year 2005, San Francisco Air Basin.

	Emission Factors				
	NOx	CO	POC	SOx	PM10
Light Duty Trucks/Cars (lbs/vmt)(1)	0.00163	0.01612	0.00160	0.00001	0.00008
Light Duty Trucks (lbs/1000 gals)(2)	41.87820	369.45051	33.92633	0.19942	1.62860
Medium Duty Trucks (lbs/1000 gals)(3)	40.59	262.67	25.01	0.21	1 32

Notes:
(1) From EMFAC 2002 v 2.2, average of light duty automobiles and light duty trucks, fleet average for calendar year 2005, San Franciso Air Basin.
(2) From EMFAC 2002 v2.2, light duty trucks (gasoline and Diesel), fleet average for calendar year 2005, San Francisco Air Basin.
(3) From EMFAC 2002 v2.2, medium duty trucks (gasoline and Diesel), fleet average for calendar year 2005, San Franciso Air Basin.

Gasoline Equipment Factors - Small Engines

			(gm/bhp-hr)		
	NOx	CO	POC	SO2	PM10
Small Equipment(1) (g/bhp-hr)	2.03	353.00	19.13	0.00	0.06
Small Equipment(1) (lb/1000 gal)	79 44	13813 38	748.58	0.00	2.35

Notes

(1) From EPA's "Non-road Engine and Vehicle Emission Study Report", 11/91, Table 2-07, for generator sets, welders, pumps, and air compressors less than 50 hp.

Worker Travel Daily Emissions (Maximum Monthly)

Number of Workers Per Day(1)	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Vehicle Miles Traveled Per Day (Miles)	Emission Factors (lbs/vmt)(1)					Daily Emissions (lbs/day)				
					NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
250	1.3	192	70	13462	0.0016	0.0161	0.0016	0.0000	0.0001	21.99	216.95	21.56	0.12	1.03

Notes:
(1) See notes for combustion emissions.

Worker Travel Annual Emissions

Average Number of Workers Per Day	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Days per Year	Vehicle Miles Traveled Per Year	Emission Factors (lbs/vmt)(1)					Annual Emissions (tons/yr)				
						NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
157	1.3	121	70	240	2,025,692	0.0016	0.0161	0.0016	0.0000	0.0001	1.65	16.32	1.62	0.01	0.08

Notes:
(1) See notes for combustion emissions.

Delivery Truck Daily Emissions (Maximum Monthly)

Number of Deliveries Per Day(1)	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)					Daily Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
26	70	1820	0.0354	0.0203	0.0026	0.0004	0.0008	64.49	36.92	4.81	0.75	1.39
Idle exhaust (2)												0.1092

Notes:
(1) See notes for combustion emissions.
(2) 26 trucks per day times 1 hr idle time per visit times 0.0042 lb/hr.

Delivery Truck Annual Emissions

Average Number of Deliveries Per Year	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Year	Emission Factors (lbs/vmt)(1)					Annual Emissions (tons/yr)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
2400	70	168000.00	0.0354	0.0203	0.0026	0.0004	0.0008	2.98	1.70	0.22	0.03	0.06
Idle exhaust (2,3)												0.00504

Notes:
(1) See notes for combustion emissions.
(2) Annual average of 10 trucks per day, 240 days per year times 1 hr idle time per visit times 0.0042 lb/hr
(3) Based on 1.91 g/hr idle emission rate for the composite HDD truck fleet in 2001 from EPA's PART5 model.

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Run Date 01/16/04 15 15 53
Scen Year 2005 -- Model Years 1965 to 2005
Season Annual
Area San Francisco Air Basin Average
I/M Stat I and M program in effect
Emissions Tons Per Day

	LDA-NCAT	LDA-CAT	LDA-DSL	LDA-TOT	LDT1-NCAT	LDT1-CAT	LDT1-DSL	LDT1-TOT	LDT2-NCAT	LDT2-CAT	LDT2-DSL
Vehicles	67414	2972660	15394	3055470	23488	580582	14396	618465	12480	711733	8207
VMT/1000	790	100533	324	101647	410	19137	402	19949	224	24540	284
Trips	287679	18757200	88176	19133100	101829	3639110	88494	3829430	55412	4517670	51784
Reactive Organic Gas Emissions											
Run Exh	4 9	16 99	0 09	21.99	2 52	4 44	0 07	7.03	1 33	4 66	0 03
Idle Exh	0	0	0	0	0	0	0	0	0	0	0
Start Ex	1 72	21 34	0	23 06	0.59	4 53	0	5 12	0 3	5 43	0
Total Ex	6 62	38 33	0 09	45 05	3 11	8 97	0 07	12 15	1.63	10 09	0 03
Diurnal	0.39	3 12	0	3 51	0.13	0 72	0	0 85	0 07	0 63	0
Hot Soak	0 9	2 72	0	3 61	0 32	0 66	0	0.98	0 17	0 57	0
Running	5 65	17 42	0	23.06	1 25	5 85	0	7 11	0 55	5 37	0
Resting	0 19	1 16	0	1 35	0 07	0 29	0	0 35	0 03	0 23	0
Total	13 74	62 75	0 09	76 58	4 87	16 5	0 07	21 44	2.46	16 9	0 03
Carbon Monoxide Emissions											
Run Exh	63 55	439 06	0 28	502 89	33 49	134 92	0 3	168 71	17 89	132 33	0 17
Idle Exh	0	0	0	0	0	0	0	0	0	0	0
Start Ex	9 55	224 61	0	234 16	3 44	58 78	0	62.21	1.84	61.47	0
Total Ex	73 1	663 67	0 28	737 05	36.93	193 7	0 3	230 93	19 73	193 79	0 17
Oxides of Nitrogen Emissions											
Run Exh	4	51 66	0 49	56.15	2 04	15 7	0 56	18.31	1.09	22 43	0 42
Idle Exh	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0 46	12 77	0	13 23	0 16	2 74	0	2 9	0 09	5 16	0
Total Ex	4 46	64 43	0 49	69 37	2 2	18 45	0 56	21 21	1 18	27 59	0 42
Carbon Dioxide Emissions (000)											
Run Exh	0.43	40 37	0 13	40.93	0 22	9 32	0 15	9 7	0 12	11 99	0 11
Idle Exh	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0 06	1 55	0	1 61	0 02	0 36	0	0 39	0 01	0.45	0
Total Ex	0 49	41 92	0 13	42 54	0.24	9 68	0 15	10 08	0 13	12 44	0 11
PM10 Emissions											
Run Exh	0 03	1 12	0 05	1 2	0 01	0 23	0 03	0 28	0.01	0 55	0 02
Idle Exh	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0	0 13	0	0 14	0	0 03	0	0 03	0	0 06	0
Total Ex	0 03	1 25	0 05	1 34	0 02	0 26	0.03	0 31	0 01	0 61	0 02
TireWear	0 01	0 89	0	0 9	0	0 17	0	0 18	0	0 22	0
BrakeWr	0 01	1 39	0	1 41	0.01	0 26	0 01	0 28	0	0 34	0
Total	0 05	3 53	0 06	3 64	0 02	0 69	0.04	0 76	0 01	1.16	0 02
Lead	0	0	0	0	0	0	0	0	0	0	0
SOx	0 01	0 41	0 01	0 43	0	0 1	0 01	0.11	0	0 12	0.01
Fuel Consumption (000 gallons)											
Gasoline	63 96	4411 67	0	4475 63	31.81	1025 72	0	1057 53	17 29	1308 48	0
Diesel	0	0	11 73	11.73	0	0	13 89	13 89	0	0	9 79

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	LDT2-TOT	MDV-NCAT	MDV-CAT	MDV-DSL	MDV-TOT	LHDT1-NC/	LHDT1-CA1	LHDT1-DSL	LHDT1-TO1	LHDT2-NC/	LHDT2-CA1	LHDT2-DSL	LHDT2-TO1	MHDT-NCA	MHDT-CAT	MHDT-DSL	MHDT-TOT	HHDT-NCA	HHDT-CAT	HHDT-DSL
Vehicles	732420	5615	363369	11141	380125	1438	34381	6749	42569	7	8851	6875	15733	2194	10708	36009	48912	438	3084	28936
VMT/1000	25048	103	12439	409	12952	12	1977	457	2446	0	437	361	798	19	483	2180	2681	6	260	4462
Trips	4624860	25852	2304600	71509	2401960	47566	1136880	84893	1269340	227	292681	86478	379386	100213	489018	1009700	1598930	20018	140854	146430
Reactive Or																				
Run Exh	6.02	0.71	3.18	0.04	3.93	0.1	0.46	0.18	0.74	0	0.26	0.19	0.45	0.14	0.4	0.82	1.36	0.1	0.91	3.31
Idle Exh	0	0	0	0	0	0	0.05	0	0.05	0	0.01	0	0.01	0	0.02	0.02	0.05	0	0	0.24
Start Ex	5.73	0.17	3.67	0	3.84	0.4	0.69	0	1.08	0	0.29	0	0.29	1.24	0.93	0	2.17	0.42	0.72	0
Total Ex	11.76	0.88	6.84	0.04	7.76	0.5	1.2	0.18	1.88	0	0.56	0.19	0.75	1.38	1.36	0.83	3.58	0.51	1.63	3.55
Diurnal	0.7	0.02	0.34	0	0.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hot Soak	0.75	0.05	0.33	0	0.39	0.04	0.05	0	0.09	0	0.03	0	0.03	0.05	0.04	0	0.09	0.01	0.02	0
Running	5.92	0.17	2.89	0	3.07	0.33	0.8	0	1.13	0	0.49	0	0.49	0.46	0.94	0	1.4	0.11	0.42	0
Resting	0.27	0.01	0.13	0	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	19.39	1.14	10.55	0.04	11.72	0.87	2.04	0.18	3.1	0	1.07	0.19	1.27	1.89	2.35	0.83	5.07	0.64	2.07	3.55
Carbon Mon																				
Run Exh	150.39	12.71	71.01	0.23	83.95	2.01	5.26	0.58	7.85	0.01	3.4	0.56	3.97	3.32	7.03	5.27	15.61	3.35	12.88	13.28
Idle Exh	0	0	0	0	0	0.01	0.3	0.01	0.32	0	0.08	0.01	0.08	0.03	0.15	0.1	0.28	0	0	1.42
Start Ex	63.31	1.32	37.82	0	39.14	2.24	8.86	0	11.1	0.01	3.9	0	3.91	7.08	16.68	0	23.76	5.79	11.23	0
Total Ex	213.7	14.04	108.83	0.23	123.09	4.27	14.42	0.58	19.27	0.02	7.38	0.57	7.96	10.43	23.85	5.37	39.65	9.13	24.12	14.7
Oxides of Ni																				
Run Exh	23.94	0.71	14.69	0.62	16.02	0.03	0.92	2.92	3.87	0	0.52	2.45	2.97	0.08	1.86	26.82	28.76	0.15	4.09	73.67
Idle Exh	0	0	0	0	0	0	0	0.02	0.02	0	0	0.02	0.02	0	0	0.31	0.31	0	0	4.34
Start Ex	5.25	0.06	2.95	0	3	0.04	1.65	0	1.69	0	0.6	0	0.6	0.12	1.67	0	1.79	0.1	1.41	0
Total Ex	29.19	0.76	17.64	0.62	19.02	0.07	2.58	2.94	5.59	0	1.12	2.47	3.59	0.2	3.53	27.13	30.86	0.24	5.5	78.01
Carbon Diox																				
Run Exh	12.22	0.06	8.41	0.16	8.63	0.01	2.11	0.26	2.39	0	0.47	0.22	0.68	0.01	0.36	3.62	4	0	0.17	10.63
Idle Exh	0	0	0	0	0	0	0.01	0	0.01	0	0	0	0	0	0	0.02	0.02	0	0	0.22
Start Ex	0.46	0.01	0.32	0	0.32	0.01	0.05	0	0.06	0	0.01	0	0.01	0.02	0.02	0	0.04	0	0.01	0
Total Ex	12.68	0.07	8.73	0.16	8.95	0.02	2.17	0.26	2.46	0	0.48	0.22	0.7	0.04	0.39	3.63	4.06	0.01	0.17	10.85
PM10 Emiss																				
Run Exh	0.57	0	0.27	0.02	0.3	0	0.02	0.04	0.06	0	0.01	0.04	0.05	0	0.01	0.78	0.79	0	0	1.46
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0.1
Start Ex	0.06	0	0.03	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Ex	0.63	0	0.3	0.02	0.33	0	0.03	0.04	0.06	0	0.01	0.04	0.05	0	0.01	0.79	0.8	0	0.01	1.56
TireWear	0.22	0	0.11	0	0.11	0	0.03	0.01	0.03	0	0.01	0	0.01	0	0.01	0.03	0.04	0	0	0.18
BrakeWr	0.35	0	0.17	0.01	0.18	0	0.03	0.01	0.03	0	0.01	0	0.01	0	0.01	0.03	0.04	0	0	0.06
Total	1.2	0.01	0.59	0.03	0.62	0	0.08	0.05	0.13	0	0.02	0.05	0.07	0	0.02	0.85	0.87	0	0.01	1.8
Lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOx	0.13	0	0.09	0.01	0.1	0	0.02	0.02	0.04	0	0	0.02	0.02	0	0	0.32	0.33	0	0	0.97
Fuel Consur																				
Gasoline	1325.77	9.72	913.43	0	923.15	3.28	224.71	0	227.99	0.02	50.63	0	50.65	5.95	44.13	0	50.08	2.46	22.01	0
Diesel	9.79	0	0	14.07	14.07	0	0	23.79	23.79	0	0	19.53	19.53	0	0	326.88	326.88	0	0	976.88

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	HHDT-TOT	LHV-NCAT	LHV-CAT	LHV-DSL	LHV-TOT	SBUS-NCA	SBUS-CAT	SBUS-DSL	SBUS-TOT	UB-NCAT	UB-CAT	UB-DSL	UB-TOT	MH-NCAT	MH-CAT	MH-DSL	MH-TOT	MCY-NCAT	MCY-CAT	MCY-DSL	MCY-TOT	ALL-TOT
Vehicles	32458	0	0	0	0	141	671	4354	5167	233	2412	5089	7734	4722	37360	2432	44513	64415	11530	0	75945	5059510
VMT/1000	4727	0	0	0	0	6	28	177	210	28	296	621	945	58	515	35	607	467	103	0	570	172581
Trips	307302	0	0	0	0	565	2685	17416	20666	931	9648	20357	30936	472	3737	243	4453	128818	23057	0	151875	33752200
Reactive Or																						
Run Exh	4 32	0	0	0	0	0 05	0 05	0 08	0 19	0 29	0 74	0 74	1 77	0 41	0 4	0 01	0 82	2 02	0 21	0	2 23	50 84
Idle Exh	0 24	0	0	0	0	0	0 01	0 01	0 02	0	0	0	0	0	0	0	0	0	0	0	0	0 37
Start Ex	1 14	0	0	0	0	0 01	0 01	0	0 02	0 02	0 05	0	0 06	0 01	0 01	0	0 01	0 4	0 07	0	0 47	42 99
Total Ex	5 69	0	0	0	0	0 06	0 07	0 09	0 23	0 31	0 79	0 74	1 84	0 42	0 41	0 01	0 83	2 43	0 27	0	2 7	94 2
Diurnal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 01	0	0 01	0 09	0 07	0	0 16	5 61
Hot Soak	0 03	0	0	0	0	0	0	0	0	0	0	0	0 01	0	0	0	0	0 1	0 02	0	0 11	6 09
Running	0 53	0	0	0	0	0 01	0 01	0	0 02	0 02	0 02	0	0 04	0	0 01	0	0 01	0 64	0 14	0	0 78	43 56
Resting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 04	0 02	0	0 06	2 17
Total	6 25	0	0	0	0	0 07	0 09	0 09	0 25	0 33	0 82	0 74	1 88	0 42	0 43	0 01	0 85	3 3	0 52	0	3 82	151.63
Carbon Mor																						
Run Exh	29 51	0	0	0	0	1 14	0 81	0 52	2 47	5 9	5 59	3	14 49	10 06	12 29	0 05	22 4	26 58	2 83	0	29 41	1031 65
Idle Exh	1 42	0	0	0	0	0 01	0 06	0 07	0 13	0	0	0	0	0	0	0	0	0	0	0	0	2 23
Start Ex	17 02	0	0	0	0	0 06	0 19	0	0 25	0 09	0 79	0	0 88	0 03	0 13	0	0 16	1 18	0 47	0	1 65	457 55
Total Ex	47 95	0	0	0	0	1 21	1 05	0 59	2 85	5 99	6.37	3	15 36	10 09	12 42	0 05	22 56	27 76	3 3	0	31 07	1491 43
Oxides of Ni																						
Run Exh	77 9	0	0	0	0	0 02	0 12	2 33	2 47	0 12	1.38	15 73	17 24	0 23	1 46	0 43	2 12	0 69	0 16	0	0 85	250 59
Idle Exh	4 34	0	0	0	0	0	0	0 21	0 21	0	0	0	0	0	0	0	0	0	0	0	0	4 91
Start Ex	1 51	0	0	0	0	0	0 01	0	0.01	0	0 07	0	0 08	0	0 01	0	0 01	0 05	0	0	0 05	30 12
Total Ex	83 75	0	0	0	0	0 02	0 13	2 54	2 69	0 12	1 46	15 73	17 31	0 24	1 46	0 43	2 13	0 74	0 16	0	0 9	285 62
Carbon Diox																						
Run Exh	10 8	0	0	0	0	0	0 02	0 29	0 32	0 02	0 24	1 91	2 17	0 04	0.39	0 06	0 49	0 06	0 01	0	0 07	92 4
Idle Exh	0 22	0	0	0	0	0	0	0 01	0 01	0	0	0	0	0	0	0	0	0	0	0	0	0 27
Start Ex	0 01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 01	0	0	0 01	2 91
Total Ex	11 03	0	0	0	0	0 01	0 02	0 3	0 33	0 02	0 24	1 91	2 18	0 04	0 39	0 06	0 49	0 06	0 02	0	0 08	95 58
PM10 Emiss																						
Run Exh	1 46	0	0	0	0	0	0	0 09	0 09	0	0 01	0 29	0 3	0	0	0 01	0 01	0 03	0	0	0 03	5 14
Idle Exh	0 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 11
Start Ex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 27
Total Ex	1 56	0	0	0	0	0	0	0 09	0 09	0	0 01	0 29	0 3	0	0	0 01	0 01	0 03	0	0	0 03	5 52
TireWear	0 18	0	0	0	0	0	0	0	0	0	0	0 01	0 01	0	0 01	0	0 01	0	0	0	0	1 69
BrakeWr	0 07	0	0	0	0	0	0	0	0	0	0	0 01	0 01	0	0.01	0	0.01	0 01	0	0	0 01	2.39
Total	1 81	0	0	0	0	0	0	0 1	0 1	0	0 01	0 31	0 32	0	0 02	0 01	0 03	0 04	0	0	0.04	9 6
Lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOx	0 97	0	0	0	0	0	0	0 03	0 03	0	0	0 17	0 17	0	0	0 01	0 01	0	0	0	0	2 36
Fuel Consur																						
Gasoline	24 47	0	0	0	0	0.75	2 75	0	3 5	3 47	26 3	0	29 78	6 23	41 94	0	48 18	11 92	2 2	0	14 11	8230 84
Diesel	976 88	0	0	0	0	0	0	27 3	27 3	0	0	171.69	171 69	0	0	5 18	5 18	0	0	0	0	1600 74

Onsite Combustion Emissions

Equipment	HP Cat	Tier	Base Factors g/bhp, if Tier 1 >50 hp (1) BSFC lb/h	NOx	CO	VOC	SOx	PM10	Appendix A Table A3 Adjustment (2) Adj Type	NOx	CO	VOC	SOx	PM10	Adjustment (3) PM10 Fuel S	Adjusted Factors BSFC	NOx	CO	VOC	SOx	PM10
Crane	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Wrecking Ball	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Dozer	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Scraper	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Grader	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Backhoe	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	6.16	6.08	1.19	0.0064	0.82
Loader	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Truck- Water	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Forklift	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Dump Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Service Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Boom Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Truck- Fuel/Lube	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Concrete Pumper Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Trucks- Pickup 3/4 ton	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Light Plants	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.094	0.40	6.90	5.00	1.80	0.0053	0.71
Air Compressor	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.094	0.40	6.90	5.00	1.80	0.0053	0.71

Equipment	Tier	Adjusted factors lbs/gallon (4) NOx	CO	VOC	SOx	PM10	Total Daily Fuel Use(5) (Gals/day)	Daily Emissions Lbs/day NOx	CO	VOC	SOx	PM10	Total Annual Fuel Use(6) (Gals/yr)	Annual Emissions Lbs/yr NOx	CO	VOC	SOx	PM10
Crane	1	237.87	31.88	13.16	0.21	7.09	70.00	16.65	2.23	0.92	0.01	0.50	7,700	1831.58	245.48	101.31	1.60	54.60
Wrecking Ball	1	237.87	31.88	13.16	0.21	7.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Dozer	1	226.75	56.00	15.00	0.21	10.88	0.00	0.00	0.00	0.00	0.00	0.00	1,540	349.19	86.23	23.11	0.32	16.75
Scraper	1	223.74	48.29	13.68	0.21	9.43	0.00	0.00	0.00	0.00	0.00	0.00	1,260	281.91	60.85	17.24	0.26	11.88
Grader	1	226.75	56.00	15.00	0.21	10.88	0.00	0.00	0.00	0.00	0.00	0.00	2,100	476.17	117.59	31.51	0.44	22.84
Backhoe	1	200.23	197.65	38.81	0.21	26.63	52.50	10.51	10.38	2.04	0.01	1.40	8,050	1611.86	1591.09	312.44	1.67	214.40
Loader	1	202.03	137.47	20.79	0.21	18.44	0.00	0.00	0.00	0.00	0.00	0.00	2,100	424.27	288.69	43.66	0.44	38.72
Truck- Water	na	167.27	95.77	12.48	0.21	3.62	0.00	0.00	0.00	0.00	0.00	0.00	3,067	513.10	293.77	38.29	0.64	11.09
Forklift	1	202.03	137.47	20.79	0.21	18.44	52.50	10.61	7.22	1.09	0.01	0.97	7,700	1555.65	1058.54	160.09	1.60	141.97
Dump Truck	na	167.27	95.77	12.48	0.21	3.62	0.00	0.00	0.00	0.00	0.00	0.00	6,573	1099.49	629.50	82.05	1.38	23.76
Service Truck	na	74.40	59.47	5.57	0.21	4.83	10.92	0.81	0.65	0.06	0.00	0.05	3,931	292.50	233.77	21.88	0.83	19.00
Boom Truck	na	167.27	95.77	12.48	0.21	3.62	10.92	1.83	1.05	0.14	0.00	0.04	1,529	255.73	146.41	19.08	0.32	5.53
Truck- Fuel/Lube	na	167.27	95.77	12.48	0.21	3.62	21.91	3.66	2.10	0.27	0.00	0.08	4,382	733.00	419.67	54.70	0.92	15.84
Concrete Pumper Truck	na	167.27	95.77	12.48	0.21	3.62	21.91	3.66	2.10	0.27	0.00	0.08	3,944	659.70	377.70	49.23	0.83	14.26
Trucks- Pickup 3/4 ton	na	41.88	369.45	33.93	0.20	1.63	10.92	0.46	4.03	0.37	0.00	0.02	1,529	64.02	564.82	51.87	0.30	2.49
Light Plants	0	270.01	195.66	70.44	0.21	27.64	8.89	2.40	1.74	0.63	0.00	0.25	1,778	480.07	347.88	125.24	0.37	49.15
Air Compressor	0	270.01	195.66	70.44	0.21	27.64	8.89	2.40	1.74	0.63	0.00	0.25	1,778	480.07	347.88	125.24	0.37	49.15
Total =							269.38	53.00	33.23	6.42	0.06	3.62	58,961.00	11,108.32	6,809.88	1,256.93	12.28	691.42
														5.55	3.40	0.63	0.01	0.35 tons/yr

(1) - Steady State Emission Factors from Table A2 of EPA November 2002 NR-009b Publication
(2) - In use adjustment factors per Table A3 EPA November 2002 NR-009b Publication
(3) - PM10 and SO2 adjustments due to Equation 5 and Equation 7 on pages 18 and 19, Respectively of EPA Report No NR-009b
(4) - Calculation uses adjusted BSFC and assumed 7.1 lbs/gallon The onroad emission factors are not adjusted
(5) - Daily fuel use based on peak combustion month equipment schedule
(6) - Annual fuel use based on average level during peak 12-month period

Construction Equipment Daily Fuel Use (peak period)					
Equipment	Gasoline/ Diesel	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Total Fuel Use (Gals/day)
Grader	D	0	7	5.00	0.00
Dozer	D	0	7	5.50	0.00
Scraper	D	0	7	9.00	0.00
Forklift	D	3	7	2.50	52.50
Backhoe	D	3	7	2.50	52.50
Crane	D	2	7	5.00	70.00
Loader	D	0	7	2.50	0.00
Field truck (3/4T)	D	2	7	0.78	10.92
Wrecking Ball	D	0	7	5.00	0.00
Dump truck	D	0	7	3.13	0.00
Water truck	D	0	7	3.13	0.00
Service truck	D	1	7	1.56	10.92
Fuel Truck	D	1	7	3.13	21.91
Boom truck	D	1	7	1.56	10.92
Concrete pump	D	1	7	3.13	21.91
Port air compressor	D	1	7	1.27	8.89
Port. Light plant	D	1	7	1.27	8.89
Total =					269.36

Construction Equipment Annual Fuel Use (peak 12-month period)								
Equipment	Gasoline/ Diesel	17-Month Average Number of Units Per Year(1)	Peak 12-Month Average Number of Units Per Year(1)	Average Operating Hrs/Day Per Unit	Gals/Hr Per Unit	Average Operating Days per Year	17-Month Average Total Fuel Use (Gals/yr)	Peak 12-Month Average Total Fuel Use (Gals/yr)
Grader	D	0.18	0.25	7	5.00	240	1,482	2,100
Dozer	D	0.12	0.17	7	5.50	240	1,087	1,540
Scraper	D	0.06	0.08	7	9.00	240	889	1,260
Forklift	D	1.41	1.83	7	2.50	240	5,929	7,700
Backhoe	D	1.35	1.92	7	2.50	240	5,682	8,050
Crane	D	0.65	0.92	7	5.00	240	5,435	7,700
Loader	D	0.76	0.50	7	2.50	240	3,212	2,100
Field truck (3/4T)	D	0.94	1.17	7	0.78	240	1,233	1,529
Wrecking Ball	D	0.12	0.00	7	5.00	240	988	0
Dump truck	D	1.59	1.25	7	3.13	240	8,352	6,573
Water truck	D	0.59	0.58	7	3.13	240	3,093	3,067
Service truck	D	1.06	1.50	7	1.56	240	2,775	3,931
Fuel Truck	D	0.59	0.83	7	3.13	240	3,093	4,382
Boom truck	D	0.41	0.58	7	1.56	240	1,079	1,529
Concrete pump	D	0.53	0.75	7	3.13	240	2,784	3,944
Port air compressor	D	0.59	0.83	7	1.27	240	1,255	1,778
Port. Light plant	D	0.59	0.83	7	1.27	240	1,255	1,778
Total =							49,625	58,961

SFERC - Construction Modeling

Short Term Impacts (24 hours and less)	NOx	CO	SOx	PM10
Combustion (lbs/day)	53.0	33.2	0.06	3.73
Construction Dust (lbs/day)				15.98
Windblown Dust (lbs/day)				0.75

Long Term Impacts (annual)	NOx	CO	SOx	PM10
Combustion (tons/yr)	5.55	3.40	0.01	0.35
Construction Dust (tons/yr)				1.40
Windblown Dust (tons/yr)				0.10

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Pipeline Construction - Combustion Emissions

			Base Factors g/bhp, if Tier 1 >50 hp (1)						Appendix A Table A3 Adjustment (2)						Adjustment (3)	Adjusted Factors					
Equipment	HP Cat.	Tier	BSFC lb/hp-hr	NOx	CO	VOC	SOx	PM10	Adj. Type	NOx	CO	VOC	SOx	PM10	PM10 Fue	BSFC	NOx	CO	VOC	SOx	PM10
Excavator	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0 2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0 22
Roller	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0 26
Water Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Service Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Trucks- Pickup	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad

		Adjusted factors lbs/1000 gallon (4)					Total Daily Fuel Use(5) (Gals/day)	Daily Emissions Lbs/day				
Equipment	Tier	NOx	CO	VOC	SOx	PM10		NOx	CO	VOC	SOx	PM10
Excavator	1	223.74	48 29	13 68	0.21	9.43	38.50	8.61	1.86	0.53	0.01	0.36
Roller	1	226.75	56.00	15.00	0.21	10.88	17.50	3.97	0.98	0.26	0.00	0.19
Water Truck	na	167.27	95.77	12 48	1.94	3.62	21.91	3.66	2.10	0.27	0.04	0.08
Service Truck	na	74 40	59 47	5.57	0.21	4 83	10.92	0.81	0.65	0.06	0 00	0 05
Trucks- Pickup	na	41 88	369.45	33.93	0.20	1.63	5 46	0.23	2.02	0.19	0.00	0.01
Total =							94.29	17.29	7.60	1.31	0 06	0 69

(1) - Steady State Emission Factors from Table A2 of EPA November 2002 NR-009b Publication.
(2) - In use adjustment factors per Table A3 EPA November 2002 NR-009b Publication.
(3) - PM10 and SO2 adjustments due to Equation 5 and Equation 7 on pages 18 and 19, Respectively of EPA Report No. NR-009b
(4) - Calculation uses adjusted BSFC and assumed 7.1 lbs/gallon. The onroad emission factors are not adjusted
(5) - Based on 7 hrs/day of equipment operation.

Pipeline Construction - Daily Fugitive Dust Emissions

Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM2.5 Emission Factor(1) (lbs/unit)	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM2.5 Emissions (lbs/day)	PM10 Emissions (lbs/day)
Excavator	1	662	662	tons	2.82661E-05	8.99E-05	0%	0.02	0.06
Pickup Truck Unpaved Road Travel	1	0.9	0.9	vmt	0.15	0.99	92%	0.01	0.07
Service Truck Unpaved Road Travel	1	0.9	0.9	vmt	0.22	1.43	92%	0.02	0.11
Water Truck Unpaved Road Travel	1	0.9	0.9	vmt	0.44	2.84	92%	0.03	0.21
Windblown Dust (active construction area)	N/A	5,000	5,000	sq.ft.	6.72783E-06	1.68E-05	92%	0.00	0.01
Total =								0.08	0.45

Notes:
(1) See notes for fugitive dust emission calculations.

Pipeline Construction - Delivery Truck Daily Emissions

Number of Deliveries Per Day(1)	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)					Daily Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
7	70	490	0.0354	0.0203	0.0026	0.0004	0.0008	17.36	9.94	1.30	0.20	0.38
Idle exhaust (2)												0.0294

Notes:

(1) See notes for combustion emissions.

(2) 7 trucks per day times 1 hr idle time per visit times 0.0042 lb/hr.

Pipeline Construction - Worker Travel Daily Emissions														
Number of Workers Per Day(1)	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Vehicle Miles Traveled Per Day (Miles)	Emission Factors (lbs/vmt)(1)					Daily Emissions (lbs/day)				
					NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
15	1.3	12	70	808	0.0016	0.0161	0.0016	0.0000	0.0001	1.32	13.02	1.29	0.01	0.06

Notes:
(1) See notes for combustion emissions.

Daily Pipeline Construction Emissions (lbs/day)						
	NOx	CO	VOC	SOx	PM2.5	PM10
Onsite						
Construction Equipment	17.29	7.60	1.31	0.06	0.69	0.69
Fugitive Dust					0.08	0.45
Subtotal =	17.29	7.60	1.31	0.06	0.78	1.15
Offsite						
Worker Travel	1.32	13.02	1.29	0.01	0.06	0.06
Truck Deliveries	17.36	9.94	1.30	0.20	0.38	0.38
Subtotal =	18.68	22.96	2.59	0.21	0.44	0.44
Total =	35.97	30.56	3.90	0.27	1.21	1.59

APPENDIX 8.1E

Evaluation of Best Available Control Technology

APPENDIX 8.1E

EVALUATION OF BEST AVAILABLE CONTROL TECHNOLOGY

Rule 2-2-301 requires the application of BACT to any new or modified emissions unit if the new unit or modification results in an increase in permitted daily emissions greater than 10 pounds per day. BACT is defined in Rule 2-2-206 as the most stringent emission limitation or control technique of the following:

206.1 The most effective emission control device or technique which has been successfully utilized for the type of equipment comprising such a source; or

206.2 The most stringent emission limitation achieved by an emission control device or technique for the type of equipment comprising such a source; or

206.3 Any emission control device or technique determined to be technologically feasible and cost-effective by the APCO; or

206.4 The most effective emission control limitation for the type of equipment comprising such a source which the EPA states, prior to or during the public comment period, is contained in an approved implementation plan of any state, unless the applicant demonstrates to the satisfaction of the APCO that such limitations are not achievable. Under no circumstances shall the emission control required be less stringent than the emission control required by any applicable provision of federal, state or District laws, rules or regulations.

The SFERP will have emissions in excess of 10 lb/day for NOx, POC, CO, PM_{10}, and SOx. Therefore, BACT will be required for these pollutants. The emission rates determined to be BACT for this project are summarized below. The information considered in making these determinations is discussed in detail in the following sections.

- NOx emission limit of 2.5 ppmv @ 15% O_2 constitutes BACT for natural gas-fired LM6000 combustion turbines in simple cycle. At a design exhaust NOx concentration of 2.5 ppmv at 15% O_2, the proposed project will comply with the BACT NOx emission limit.

- POC emission limit of 2 ppmv @ 15% O_2 constitutes BACT for natural gas-fired simple cycle combustion turbines. At a design exhaust POC concentration of 2 ppmv at 15% O_2, the proposed modification will comply with the BACT VOC emission limit.

- CO emission limit of 4 ppmv @ 15% O_2 constitutes BACT for natural gas-fired simple cycle combustion turbines. At a design exhaust CO concentration of 4 ppmv at 15% O_2, the proposed project will comply with the BACT CO emission limit.

- The use of natural gas with an annual average sulfur content of 0.33 grains per 100 scf constitutes BACT for this project. District BACT Guideline 89.1.3 specifies BACT 2 (achieved in practice) for SO_2 for simple cycle gas turbines with an

output rating of > 50 MW as the exclusive use of clean-burning natural gas.

- BACT for PM_{10} is the use of natural gas as the fuel source.

8.1E.1 Top-Down BACT Analysis for Control of Nitrogen Oxides

The following "top-down" BACT analysis for NO_x has been prepared in accordance with EPA's 1990 Draft New Source Review Workshop Manual. A "top-down" BACT analysis takes into account energy, environmental, economic, and other costs associated with each alternative technology.

8.1E.1.1 Identify All Control Technologies

The baseline NOx emission rate for this analysis is considered to be 75 ppmvd @ 15% O_2, based on the governing new source performance standard (40 CFR 60 Subpart GG). This emission rate provides the frame of reference for the evaluation of control effectiveness and feasibility. The maximum degree of control, resulting in the minimum emission rate, is a combination of water injection and either selective catalytic reduction or SCONOx to achieve a long-term NOx limit of approximately 2.0 ppmvd. Several intermediate levels of control are also evaluated.

There are three basic means of controlling NOx emissions from combustion turbines: wet combustion controls, dry combustion controls, and post-combustion controls. Wet and dry combustion controls act to reduce the formation of NOx during the combustion process, while post-combustion controls remove NOx from the exhaust stream. Potential NOx control technologies for combustion gas turbines include the following:

Wet combustion controls

Water injection

Steam injection

Dry combustion controls

Dry low-NOx combustor design

Catalytic combustors (e.g., XONON)

Other combustion modifications

Post-combustion controls

Selective non-catalytic reduction (SNCR)

Non-selective catalytic reduction (NSCR)

Selective catalytic reduction (SCR)

SCONOx

8.1E.1.2 Eliminate Technically Infeasible Options

The performance and technical feasibility of available NOx control technologies are discussed in more detail below.

Combustion Modifications

Wet Combustion Controls

Steam or water injection directly into the turbine combustor is one of the most common NOx control techniques for combustion turbines. These wet injection techniques lower the flame temperature in the combustor and thereby reduce thermal NOx formation. The water or steam-to-fuel injection ratio is the most significant factor affecting the performance of wet controls. Steam injection techniques can reduce NOx emissions in gas-fired turbines to between 15 and 25 ppmv at 15% O_2; the practical limit of water injection has been demonstrated at approximately 25-42 ppmv @ 15% O_2 before combustor damage becomes significant. Higher diluent:fuel ratios (especially with steam) not only result in greater NOx reductions, but also increase emissions of CO and hydrocarbons, reduce turbine efficiency, and may increase turbine maintenance requirements. The principal NOx control mechanisms are identical for water and steam injection. Water or steam is injected into the primary combustion chamber to act as a heat sink, lowering the peak flame temperature of combustion and thus lowering the quantity of thermal NOx formed. The injected water or steam exits the turbine as part of the exhaust.

Because water has a higher heat absorbing capacity than steam (due to the temperature and to the latent heat of vaporization associated with water), it takes more steam than water to achieve an equivalent level of NOx control. Typical steam injection ratios are 0.5 to 2.0 pounds steam per pound fuel; water injection ratios are generally below 1.0 pound water per pound fuel.

Although the lower peak flame temperature has a beneficial effect on NOx emissions, it can also reduce combustion efficiency and prevent complete combustion. As a result, CO and VOC emissions increase as water/steam-to-fuel ratios increase. Thus, the higher steam-to-fuel ratio required for NOx control will tend to cause higher CO and VOC emissions from steam-injected turbines than from water-injected turbines, due to the kinetic effect of the water molecules interfering with the combustion process. However, steam injection can reduce the heat rate of the turbine so that equivalent power output can be achieved with reduced fuel consumption and reduced SO_2 emission rates.

Water and steam injection have been in use on both oil- and gas-fired combustion turbines in all size ranges for many years, so these NOx control technologies are clearly technologically feasible and widely available.

Dry Combustion Controls

Combustion modifications that lower NOx emissions without wet injection include lean combustion, reduced combustor residence time, lean premixed combustion, and two-stage rich/lean combustion. Lean combustion uses excess air (greater than stoichiometric air-to-fuel ratio) in the combustor primary combustion zone to cool the flame, thereby reducing the rate of thermal NOx formation. Reduced combustor residence times are achieved by introducing dilution air between the combustor and the turbine sooner than with standard combustors. The combustion gases are at high temperatures for a shorter time, which also has the effect of reducing the rate of thermal NOx formation.

The most advanced combination of combustion controls for NOx is referred to as dry low-NOx (DLN) combustors. DLN technology uses lean, premixed combustion to keep

peak combustion temperatures low, thus reducing the formation of thermal NOx. This technology is effective in achieving NOx emission levels comparable to levels achieved using wet injection without the need for large volumes of purified water and without the increases in CO and VOC emissions that result from wet injection. However, this control technology does not result in lower NOx emissions than can be achieved using water injection on the LM6000 combustion turbine.

Catalytic combustors use a catalytic reactor bed mounted within the combustor to burn a very lean fuel-air mixture. This technology has been commercially demonstrated under the trade name XONON in a 1.5 MW natural gas-fired combustion turbine in Santa Clara, California. The technology has also been announced as commercially available for some models of small combustion turbines, generally 10 MW in size and less. The technology has not been announced commercially for the engines used at the SFPERP. No turbine vendor, other than General Electric, has indicated the commercial availability of catalytic combustion systems at the present time; therefore, catalytic combustion controls are not available for this specific application and are not discussed further.

Post-Combustion Controls

SCR is a post-combustion technique that controls both thermal and fuel NOx emissions by reducing NOx with a reagent (generally ammonia or urea) in the presence of a catalyst to form water and nitrogen. NOx conversion is sensitive to exhaust gas temperature, and performance can be limited by contaminants in the exhaust gas that may mask the catalyst (sulfur compounds, particulates, heavy metals, and silica). SCR is used in numerous gas turbine installations throughout the United States, almost exclusively in conjunction with other wet or dry NOx combustion controls. SCR requires the consumption of a reagent (ammonia or urea) and requires periodic catalyst replacement. Estimated levels of NOx control are in excess of 90%.

Selective non-catalytic reduction (SNCR) involves injection of ammonia or urea with proprietary conditioners into the exhaust gas stream without a catalyst. SNCR technology requires gas temperatures in the range of 1200° to 2000° F and is most commonly used in boilers. The exhaust temperatures for the SFERP gas turbines are in the 800° F range, which is well below the minimum SNCR operating temperature. Some method of exhaust gas reheat, such as additional fuel combustion, would be required to achieve exhaust temperatures compatible with SNCR operations, and this requirement makes SNCR technologically infeasible for this application. Even when technically feasible, SNCR is unlikely to achieve NOx reductions in excess of 80%-85%.

Nonselective catalytic reduction (NSCR) uses a catalyst without injected reagents to reduce NOx emissions in an exhaust gas stream. NSCR is typically used in automobile exhaust and rich-burn stationary IC engines, and employs a platinum/rhodium catalyst. NSCR is effective only in a stoichiometric or fuel-rich environment where the combustion gas is nearly depleted of oxygen, and this condition does not occur in turbine exhaust where the oxygen concentrations are typically between 14 and 16%. For this reason, NSCR is not technologically feasible for this application.

SCONOx is a proprietary catalytic oxidation and adsorption technology that uses a single catalyst for the control of NOx, CO, and VOC emissions. The catalyst is a monolithic design, made from a ceramic substrate with both a proprietary platinum-

based oxidation catalyst and a potassium carbonate adsorption coating. The catalyst simultaneously oxidizes NO to NO_2, CO to CO_2, and VOCs to CO_2 and water, while NO_2 is adsorbed onto the catalyst surface where it is chemically converted to and stored as potassium nitrates and nitrites. The SCONOx potassium carbonate layer has a limited adsorption capability and requires regeneration approximately every 12-15 minutes in normal service.[2] Each regeneration cycle requires approximately 3-5 minutes. At any point in time, approximately 20% of the compartments in a SCONOx system would be in regeneration mode, and the remaining 80% of the compartments would be in oxidation/absorption mode.[3]

Regeneration of the adsorption layer requires exposure of the catalyst to hydrogen gas. In practice, this is accomplished by reforming natural gas with high-pressure steam to produce a gas mixture consisting of methane, carbon dioxide, and hydrogen that is passed over the catalyst beds.[4] Initial attempts by the developer of the process to create regeneration gases from natural gas and steam within the SCONOx catalyst bed (internal autothermal regeneration) failed to produce consistent results; this approach was abandoned in favor of the current offering, which uses an external steam-heated reformer that partially reforms the natural gas to produce the gas mixture that is introduced into the catalyst bed.[5] The reformation reaction continues to some extent within the catalyst bed due to the presence of steam and the temperature of the catalyst surface, but some methane and VOCs from the natural gas remain.

Because the active regenerant gas is hydrogen, the regeneration process must be performed in an atmosphere of low oxygen to prevent dilution of the hydrogen. In practice, the oxygen present in the exhaust gas of combustion turbines is excluded from the catalyst bed by dividing the catalyst bed into a number of individual cells or compartments that are equipped with front and rear dampers that are closed at the beginning of each regeneration cycle. Proper regeneration of the SCONOx catalyst system depends upon the proper functioning and sealing of these sets of dampers approximately 4 times per hour so that an adequate concentration of hydrogen can be maintained in each module to accomplish complete regeneration of the catalyst before the dampers are opened and the compartment is placed back in service.

Because the SCONOx catalyst can be "poisoned" or rendered inactive by even the very small amounts of sulfur compounds present in natural gas, a SCOSOx catalyst bed (or "guard bed") that is intended to remove trace quantities of sulfur-bearing compounds from the exhaust gas stream is installed upstream of the SCONOx catalyst bed. Like the SCONOx catalyst, the SCOSOx catalyst must be regenerated. Regeneration of the two catalyst types occurs at the same time, with the same regeneration gas supply provided to both; however, the sulfur-bearing regeneration gases for the SCOSOx catalyst exit the SCONOx modules separately from the SCONOx regeneration gases to avoid

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[2] Personal communication, ABB Environmental, 1/18/00.

[3] Stone & Webster, "Independent Technical Review – SCONOx Technology and Design Review", February 2000.

[4] Stone & Webster, op cit

[5] ABB Environmental, op cit

contaminating the SCONOx catalyst beds. Both regeneration gas streams are returned to the gas turbine exhaust stream downstream of the SCONOx module.[6]

The external reformer used to create the regeneration gases is supplied with steam and natural gas. For one F-class turbine, an estimated 15,000 to 20,000 lbs/hr of 600°F steam is required, along with approximately 100 pounds per hour (2.2 MMbtu/hr) of natural gas.[7] These quantities would be expected to be lower for the smaller LM6000 combustion turbines used in this project. To avoid poisoning the reformer catalyst, the natural gas supplied to the reformer passes through an activated carbon filter to remove some of the sulfur-bearing compounds that are added to natural gas to facilitate leak detection.[8]

The regeneration cycle time is expected to be controlled using a feedback system based on NOx emission rates.[9] That is, the higher the NOx emissions are relative to the design level, the shorter the absorption cycle, and regeneration cycles will occur more frequently. This is analogous to the use of feedback systems for controlling reagent (ammonia or urea) flow rates in an SCR system.

Maintenance requirements for SCONOx systems are expected to include periodic replacement of the reformer fuel sulfur carbon unit, periodic replacement of the reformer catalyst, periodic washings of the SCOSOx and SCONOx catalyst beds, and periodic replacement of the SCOSOx and SCONOx catalyst beds. The replacement frequency for the reformer sulfur carbon unit and reformer catalyst is unknown to the applicant at present. The SCOSOx catalyst is expected to require washing several times per year. The lead (upstream) SCONOx catalyst bed is also expected to require washing several times per year, while the trailing (downstream) SCONOx catalyst bed(s) are expected to require washing less frequently. The annual catalyst washing process is expected to take approximately three days for an F-class machine, at an estimated annual cost of $200,000.[10] For the smaller LM6000 CTG, the time requirement and cost can be estimated to be approximately one-third of this, or one day and $65,000. The estimated catalyst life is reported to be 7 washings;[11] the guaranteed catalyst life is 3 years.[12]

The adsorption temperature operating range for the SCONOx system is 300°F to 700°F, with an optimal temperature of approximately 600°F.[13] However, regeneration cycles are not initiated unless the catalyst bed temperature is above 450°F to avoid the creation of hydrogen sulfide during the regeneration of the SCOSOx catalyst.[14]

Estimates of control system efficiency vary. ABB Environmental has indicated that the SCONOx system is capable of achieving a 90% reduction in NOx; a 90% reduction in CO, to a level of 2 ppm; and an 80%-85% reduction in VOC emissions.[15] (This VOC

[6] ABB Environmental, op cit

[7] Ibid

[8] Stone & Webster, op cit

[9] Ibid

[10] Ibid

[11] Ibid

[12] Letter from ABB Alstom Power to Bibb & Associates dated May 5, 2000. (ABB Three Mountain Power or ABB TMP)

[13] Ibid

[14] ABB Environmental, op cit. Stone & Webster, op cit

reduction is not likely to be achieved with low VOC inlet concentrations, in the 1–2 ppm range.[16]) Commercially quoted NOx emission rates for the SCONOx system range from 2.0 ppm on a 3-hour average basis, representing a 78% reduction,[17] to 1.0 ppm with no averaging period specified (96% reduction).[18] The SCONOx system does not control or reduce emissions of sulfur oxides or particulate matter from the combustion device.[19]

The SCONOx system has been applied at the Sunlaw Federal Cogeneration Plant in Vernon California since December 1996, and at the Genetics Institute Facility in Massachusetts. The Sunlaw facility uses an LM-2500 gas turbine, rated at a nominal 23 MW, and the Genetics Institute facility has a 5 MW Solar gas turbine.

The SCONOx system was proposed for use by PG&E Generating Company at its La Paloma facility; however, PG&E Generating no longer plans to use the SCONOx system at that site.[20] The SCONOx system was also proposed for demonstration by PG&E Generating Company at the Otay Mesa Generating Project; however, PG&E Generating Company sold the project to Calpine and Calpine has indicated that it no longer plans to use SCONOx. Although the technology's co-developer, Sunlaw, proposed to use the technology in conjunction with ABB gas turbines at the Nueva Azalea site in Southern California, the Nueva Azalea project has been withdrawn from the CEC licensing process.

The University of California, San Diego, operates two SoLoNox Titan 130S combustion turbines that are equipped with SCONOx. Each CTG is rated at approximately 13 MW and has NOx and CO emissions limits of 2.5 and 5.0 ppmvd @ 15% O_2, 3-hour average, respectively. Quarterly emission reports for the first 3 quarters of 2002 showed that Unit 1 had 5219 hours of operation with 9 3-hour periods of excess emissions, while Unit 2 had 5294 hours of operation with no exceedances of the 2.5 ppm NOx limit. In 2002, the SCONOx catalyst had to be washed three times, with the units taken off-line each time.

Redding Electric Utility operates a 43 MW Alstom Power Model GTX 100 CTG that is equipped with SCONOx at its Redding power plant. The unit has NOx and CO limits of 2.5 and 6.0 ppmvd @ 15% O_2, one-hour average basis, respectively, with a "demonstration" NOx limit of 2.0 ppm. Despite initial compliance problems, the turbine is currently operating in compliance with the 2.5 ppm NOx limit, but the operator is having to wash the catalyst more often than expected. The unit has not been able to consistently meet the 2.0 ppm "demonstration" limit.

As discussed further below, there are serious questions about the probability of a successful commercial demonstration and the commercial availability of the technology for application to the SFERP, as well as the levels of emission control that can be consistently achieved. However, based on the preceding discussion, the SCONOx system will be considered as technologically feasible for the purposes of this analysis.

Based on the discussions above, the following NOx control technologies are available and potentially technologically feasible for the proposed project:

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15 ABB Environmental, op cit

16 Ibid

17 ABB TMP, op cit

18 Letter from ABB Alstom Power to Sunlaw Energy Corporation dated February 11, 2000. (ABB Sunlaw)

19 ABB Environmental, op cit

20 Ibid

- Water injection
- Selective Catalytic Reduction
- SCONOx

8.1E.1.3 Rank Remaining Control Technologies by Control Effectiveness

The remaining technically feasible control technologies are ranked by NOx control effectiveness in Table 8.1-E-1.

TABLE 8.1E-1
NOx Control Alternatives

NOx Control Alternative	Available?	Technically Feasible?	NOx Emissions (@ 15% O_2)	Environmental Impact	Energy Impacts
Water Injection	Yes	Yes	25 ppm	Increased CO/VOC	Decreased Efficiency
Steam Injection	No	No	15 – 25 ppm	Increased CO/VOC	Increased Efficiency
Dry Low-NOx Combustors	No	No	9-25 ppm	Reduced CO/VOC	Increased Efficiency
Selective Catalytic Reduction	Yes	Yes	>90% reduction 1 – 2.5 ppm	Ammonia slip	Decreased Efficiency
SCONOx	Yes[a]	Yes	>90% reduction 1 – 2.5 ppm	Reduced CO; potential reduction in VOC	Decreased Efficiency

a. There are no standard, commercial guarantees for LM6000 projects for this technology available in the public domain.

8.1E.1.4 Available Control Options and Technical Feasibility

In a March 24, 2000 letter sent to local air pollution control districts, EPA Region 9 stated that the SCONOx Catalytic Adsorption System should be included in any BACT/LAER analysis for combined cycle combustion turbine power plant projects since it can achieve the BACT/LAER emission specification for NO_x of 2.5 ppmvd @ 15% O_2, averaged over one hour or 2.0 ppmvd @ 15% O_2, averaged over three hours. In this letter, EPA stated that ABB Alstom Power, the exclusive licensee for SCONOx applications, has conducted "full-scale damper testing" that demonstrates that SCONOx is technically feasible for utility-scale combustion turbines. Stone & Webster Management Consultants, Inc. of Denver, Colorado was subsequently hired by ABB to conduct an independent technical review of the SCONOx technology as well as the full-scale damper testing program. According to the report by Stone & Webster, modifications to the actuators, fiberglass seals, and louver shaft-seal interface are being incorporated to resolve unacceptable reliability and leakage problems. However, no subsequent testing of the redesigned components has occurred to determine if the problems have been solved. Because the feasibility of the "scale-up" of the SCONOx system for large turbines has not been

demonstrated, SCONOx is not considered to be a demonstrated NO_x control technology for projects of the size of the SFERP. Further, the SFERP consists of simple-cycle and not combined-cycle combustion turbines.

Although SCONOx is not considered to be a demonstrated control alternative for this project, it may be considered a technically feasible technology, and thus we have analyzed the collateral impacts of both SCR and SCONOx. Because SCONOx does not offer any emission control benefits over SCR control technology, the following analysis compares the cost-effectiveness and collateral impacts of the two technologies. The analysis shown in Table 8.1E-2 applies to three GE LM6000 combustion turbines equipped with water injection and an uncontrolled NO_x emission rate of 25 ppmvd @ 15% O_2.

TABLE 8.1E-2
Top-Down BACT Analysis Summary for NOx

Control Technology	Controlled Emissions, tpy[a]	Emissions Controlled, tpy[b]	Average Cost-Effectiveness, \$/ton[c]	Electricity Cost Impact, \$/kwh[d]	Collateral Toxic Impacts?	Incremental Energy Impact, MMBtu/yr[e]
SCONOx	39.8	224.7	$18,671	0.981	No	109,818
SCR	39.8	224.7	$7,253	0.381	No	61,119

a. From Table 8.1A-5, based on 2.5 ppmvd controlled emission rate. Total, three turbines.
b. Based on 25 ppmvd uncontrolled emission rate from turbines, 90% control. Total, three turbines.
c. Total annual costs from ONSITE SYCOM Energy Corporation report for US DOE: "Cost Analysis of NOx Control Altematives for Stationary Gas Turbines, Contract No. DE-FC02-97CHIO877," October 15, 1999. Scaled for 47.5 MW LM6000 turbine from data in Tables A-5 and A-7.
d. Electricity cost from Ref c.
e. "Towantic Energy Project Revised BACT Analysis", RW Beck, February 18, 2000; based upon increased fuel use required to overcome catalyst bed back pressure. Scaled by ratio of Frame 7FA unit to LM6000 unit, or 161 MW/47.5 MW.

Energy Impacts

As shown in Table 8.1E-2, the use of SCR does not result in any significant or unusual energy penalties or benefits when compared to SCONOx. Although the operation and maintenance of SCONOx does result in a greater energy penalty when compared to that of SCR, this is not considered significant enough to eliminate SCONOx as a control alternative.

Economic Impacts

According to EPA's 1990 Draft New Source Review Workshop Manual, "Average and incremental cost effectiveness are the two economic criteria that are considered in the BACT analysis."

As shown in Table 8.1E-2, the average cost-effectiveness of both SCR and SCONOx meet the current District cost-effectiveness guideline of $17,500 per ton of NO_x abated. However, the average cost-effectiveness of SCR is approximately 40% of the average cost-effectiveness of SCONOx. These figures are based on total annualized cost figures

from a cost analysis conducted by ONSITE SYCOM Energy Corporation.[21] Although SCONOx will result in greater economic impact as quantified by average cost effectiveness, this impact is not considered adverse enough to eliminate SCONOx as a control alternative. Incremental cost-effectiveness does not apply since SCR and SCONOx both achieve the BACT standard for NO_x of 2.5 ppmvd @ 15% O_2, averaged over three hours and therefore achieve the same NO_x emission reduction in tons per year.

Environmental Impacts

The use of SCR will result in ammonia emissions due to an allowable ammonia slip limit of 10 ppmvd @ 15% O_2. A health risk screening analysis of the proposed project using air dispersion modeling showed an acute hazard index and a chronic hazard index to be each much less than 1, resulting from an ammonia slip limit of 10 ppmv @ 15% O_2. In accordance with the District Toxic Risk Management Policy and currently accepted practice, a hazard index of less than 1.0 or above is considered not significant. Therefore, the toxic impact of the ammonia slip resulting from the use of SCR is deemed to be not significant and is not a sufficient reason to eliminate SCR as a control alternative.

The ammonia emissions resulting from the use of SCR may have another environmental impact through its potential to form secondary particulate matter such as ammonium nitrate. Because of the complex nature of the chemical reactions and dynamics involved in the formation of secondary particulates, it is difficult to estimate the amount of secondary particulate matter that will be formed from the emission of a given amount of ammonia. However, the Research and Modeling section of the BAAQMD Planning Division has stated in previous CEC proceedings that the formation of ammonium nitrate in the Bay Area air basin is limited by the formation of nitric acid and not driven by the amount of ammonia in the atmosphere. Therefore, ammonia emissions from the proposed SCR system are not expected to contribute significantly to the formation of secondary particulate matter within the BAAQMD.

A second potential environmental impact that may result from the use of SCR involves the storage and transport of aqueous ammonia. Although ammonia is toxic if swallowed or inhaled and can irritate or burn the skin, eyes, nose, or throat, it is a commonly used material that is typically handled safely and without incident. The SFERP will be required to maintain a Risk Management Plan (RMP) and implement a Risk Management Program to prevent accidental releases (see Section 8.5 of the AFC). The RMP will provide information on the hazards of the substance handled at the facility and the programs in place to prevent and respond to accidental releases. The accident prevention and emergency response requirements reflect existing safety regulations and sound industry safety codes and standards. In addition, the modeling analyses of the health impacts arising from a catastrophic release of ammonia due to spontaneous storage tank failure at the SFERP shows that the impact would not be significant. Thus the potential environmental impact due to aqueous ammonia storage at the SFERP does not justify the elimination of SCR as a control alternative.

Conclusion

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[21] ONSITE SYCOM Energy Corporation for US DOE: "Cost Analysis of NOx Control Alternatives for Stationary Gas Turbines," Contract No. DE-FC02-97CHIO877, October 15, 1999.

Because both SCR and SCONOx can achieve the proposed BACT NO_x emission limit of 2.5 ppmvd @ 15% O_2 averaged over three hours and neither will cause significant energy, economic, or environmental impacts, neither can be eliminated as viable control alternatives. The concern remains regarding the long-term effectiveness of SCONOx as a control technology as the technology has not been demonstrated on the turbines used in this project. For this reason, and because SCR is already in use at the facility, SCR has been selected as the NOx control technology to be used for the the SFERP.

8.1E.2 Determination of BACT Emission Rates

The BACT analysis performed for NOx control includes the following:

- Review of published BACT guidelines for natural gas-fired simple cycle gas turbines;
- Review of recent BACT decisions for natural gas-fired simple-cycle gas turbines;
- Review of continuous NOx emissions monitoring data for natural gas-fired simple-cycle gas turbines obtained from EPA's acid rain website;
- Review of federal NSPS for natural gas-fired simple cycle gas turbines; and
- Review of published prohibitory rules for natural gas-fired simple cycle gas turbines.

Published BACT Guidelines

Published BACT determinations from the following agencies were reviewed to identify relevant previously established BACT guidelines:

- California Air Resources Board (ARB);
- Bay Area Air Quality Management District (BAAQMD);
- San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD); and
- South Coast Air Quality Management District (SCAQMD).

ARB's BACT Clearinghouse contained determinations by the Sacramento Metropolitan Air Quality Management District (SMAQMD) that specified water injection and SCR achieving an emission limit of 5 ppmv @ 15% O_2 as BACT for the following facilities:

- Carson Energy Group cogeneration plant in Sacramento, California; and
- Sacramento Cogeneration Authority cogeneration plant in Sacramento, California.

This clearinghouse has not been updated since 2000. ARB is also in the process of developing a new guideline document for power plant permitting. The most recent available ARB document on this

subject[22] indicated that BACT for NOx from gas turbines without heat recovery systems rated at < 50 MW was still 5 ppmv @ 15% O_2 on a 3-hour average basis.

The BAAQMD's BACT guidelines specify that, for natural gas-fired simple cycle combustion gas turbines, a NOx limit of 5 ppmv @ 15% O_2 has been "achieved in practice." This BACT guideline was established in CARB's Guidance for Power Plant Sitting and Best Available Control Technology (June 1999).

The SJVUAPCD's BACT guidelines contained a determination for gas turbines rated at less than 50 MW with uniform load and without heat recovery. The SJVUAPCD concluded that a NOx exhaust concentration of 5 ppmv @ 15% O_2 constituted BACT that had been achieved in practice and 3 ppmv @ 15% O_2 constituted BACT that is technologically feasible.

Recent BACT Decisions

The ARB staff has prepared a draft table summarizing NOx emission control requirements and permitted emission levels for simple-cycle power plant gas turbines. This table showed that most of the recently-permitted simple-cycle gas turbine projects in California have been required to meet NOx BACT limits of 2.5 to 3 ppmvd @ 15% O_2 on a 3-hour average basis. The most recent of these BACT determinations was made by the SJVUAPCD for the Modesto Irrigation District MEGS project, which also consists of GE LM6000 Sprint gas turbines equipped with water injection and SCR for NOx control. For this project, which has been approved by the District and was licensed by the CEC on February 4, 2004, NOx BACT was determined to be 2.5 ppmvd @ 15% O_2 on a 3-hour average basis.

This table also shows that in 2001, the Massachusetts Department of Environmental Protection issued two permits for GE LM6000 simple-cycle gas turbines with NOx emissions limitations of 2.0 ppmvd @ 15% O_2 on a 1-hour average basis. Only one of these facilities is currently in operation and reporting emissions data to EPA, and as discussed below, the operating facility has not been able to meet this limit in operation. The NOx limit has been changed to 3.5 ppmvd @ 15% O_2, which is higher than the level considered to be BACT in California.

The SCAQMD database included a December 2001 determination for the Wildflower Energy Indigo power plant that BACT for NOx for a simple-cycle LM5000 Sprint gas turbine was 5 ppm on a 1-hour average basis.

Review of NOx CEMS Data

Real-time hourly NOx CEMS data are available on EPA's Acid Rain website for generating units that are subject to acid rain reporting requirements. The reported NOx data for the West Springfield Redevelopment Project simple-cycle gas turbines were analyzed for compliance with the original permit limit of 2.0 ppmvd @ 15% O_2, 1-hour average basis. Five quarters of monitoring data were available for each of the two West Springfield Redevelopment Project units. Analysis of these data showed that when low-load, startup/shutdown and commissioning periods were excluded, the turbines operated in compliance with the 2.0 ppm, 1-hour average permit limit only between 10

[22] ARB Guidance for the Permitting of Electrical Generation Technologies, July 2002.

and 20% of the time (see Table 8.1E-3). Even a 3.0 ppm, 3-hour average limit would have been exceeded almost 10% of the time. The NOx limit for these turbines was recently revised to 3.5 ppmvd @ 15% O_2.

Federal NSPS

The NSPS applicable to new natural gas-fired combustion gas turbines are found in Title 40 CFR Part 60 Subpart GG. As discussed in Section 8.1.4.2.2 of the application, the NOx emission limit applicable to the proposed combustion gas turbines will be 109 ppmv @ 15% O_2.

Table 8.1E-3
Summary of NOx Emissions Performance: West Springfield Redevelopment Project LM6000 Simple Cycle Gas Turbines

Unit/Period	Averaging Prd	Exceedance Frequency Based on NOx Limit, ppmvd @ 15% O_2		
		3.0	2.5	2.0
Unit 1				
5/1 to 12/31/2002	1 hour	14%	43%	84%
	3 hours	11%	37%	82%
1/1 to 6/30/2003	1 hour	20%	34%	98%
	3 hours	13%	27%	99%
Unit 2				
5/1 to 12/31/2002	1 hour	11%	53%	79%
	3 hours	9%	56%	77%
1/1 to 6/30/2003	1 hour	7%	16%	90%
	3 hours	5%	18%	91%

District Prohibitory Rules

Published prohibitory rules from the BAAQMD, SMAQMD, San Diego County Air Pollution Control District (SDCAPCD), SJVUAPCD, and SCAQMD were reviewed to identify the NOx standards that govern existing natural gas-fired simple cycle combustion gas turbines.

- BAAQMD adopted Rule 9-9 (Nitrogen Oxides from Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 9-9 specifies an efficiency-adjusted NOx emission limit of 13.0 ppmv @ 15% O_2 for natural gas-fired combustion gas turbines rated at no less than 10 MW, rated at 9,353 Btu/kW-hr (HHV), and equipped with SCR.
- The SMAQMD adopted Rule 413 (Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 413 specifies a NOx emission limit of 9 ppmv @ 15% O_2 for natural gas-fired combustion gas turbines rated at no less than 10 MW and equipped with SCR.

- The SJVUAPCD adopted Rule 4703 (Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 4703 specifies an enhanced Tier II NOx emission limit of 3 ppmv @ 15% O_2 for natural gas-fired combustion gas turbines rated at no less than 10 MW and equipped with SCR (April 30, 2008 deadline).
- The SCAQMD adopted Rule 1134 (Emissions of Oxides of Nitrogen from Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 1134 specifies an efficiency-adjusted NOx emission limit of 13 ppmv @ 15% O_2 for natural gas-fired combustion gas turbines rated no less than 10 MW, rated at 9,353 Btu/kW-hr, and equipped with SCR.

Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the NOx BACT determination of 2.5 ppm @ 15% O_2 on a 3-hour average basis made for recently permitted simple cycle turbine projects in the Bay Area and the SJVUAPCD reflects the most stringent achievable NOx emission limit. Therefore, BACT for NOx emissions for natural gas-fired simple cycle combustion gas turbines is 2.5 ppmv @ 15% O_2. The SFERP facility will be designed to meet a NOx level of 2.5 ppmv @ 15% O_2 on a 3-hour average basis.

Carbon Monoxide

The BACT analysis performed for CO control includes the following:

- Review of published BACT guidelines for natural gas-fired simple cycle combustion gas turbines;
- Review of recent BACT decisions for natural gas-fired simple-cycle gas turbines;
- Review of federal NSPS for natural gas-fired simple cycle combustion gas turbines; and
- Review of published prohibitory rules for natural gas-fired simple cycle combustion gas turbines.

Published BACT Guidelines

As discussed in the previous section, published BACT determinations from the following agencies were reviewed to identify any previously established BACT guidelines:

- ARB;
- BAAQMD;
- SJVUAPCD; and
- SCAQMD.

The ARB's BACT guidance document for electric generating units rated at less than 50 MW[23] indicates that BACT for the control of CO emissions from stationary gas turbines rated at less than 50 MW used in electrical generation is 6 ppmvd @ 15% O_2.

The BAAQMD's BACT guidelines specify that, for natural gas-fired simple cycle combustion gas turbines, a CO limit of 6 ppmv @ 15% O_2 has been "achieved in practice." A BACT guideline of 6 ppmv @ 15% O_2 was established in CARB's Guidance for Power Plant Sitting and Best Available Control Technology (June 1999).

The SJVUAPCD's BACT guidelines contained a determination for gas turbines rated at less than 50 MW with uniform load and without heat recovery. The SJVUAPCD concluded that a CO exhaust concentration of 6 ppmv @ 15% O_2 constituted BACT that had been achieved in practice.

The SCAQMD database did not contain BACT guidelines for VOC emissions from natural gas-fired simple cycle combustion gas turbines.

Recent BACT Decisions

The ARB staff has prepared a draft table of NOx emission control requirements and permitted emission levels for simple-cycle power plant gas turbines. This table, which includes information regarding limits for VOC, CO, PM_{10}, SO_2 and ammonia, shows that most of the recently-permitted simple-cycle gas turbine projects in California have been required to meet CO BACT limits of 6 ppmvd @ 15% O_2 on a 1-hour average basis. The most recent of these BACT determinations was made by the SJVUAPCD for the Modesto Irrigation District Ripon project, which also consists of GE LM6000 Sprint gas turbines equipped with water injection and SCR for NOx control. For this project, which has been approved by the District and is expected to be licensed by the CEC before the end of 2003, CO BACT was determined to be 6 ppmvd @ 15% O_2 on a 3-hour average basis.

The SCAQMD database included a December 2001 determination for the Wildflower Energy Indigo power plant that BACT for CO for a simple-cycle LM5000 Sprint gas turbine was 6 ppm on a 1-hour average basis.

Federal NSPS

The NSPS applicable to new natural gas-fired combustion gas turbines are found in Title 40 CFR Part 60 Subpart GG. This NSPS does not specify an emission limit for CO.

District Prohibitory Rules

Published prohibitory rules from the BAAQMD, SMAQMD, SDCAPCD, SJVUAPCD, and SCAQMD were reviewed to identify the CO standards that govern existing natural gas-fired simple cycle combustion gas turbines. Of the five prohibitory rules reviewed, the SJVUAPCD prohibitory rule for combustion gas turbines is the only one that includes an emission limit for CO (200 ppmv @ 15% O_2). Generic prohibitory rules (i.e., not device specific) from each of these districts were also reviewed; emission limits are 2000 ppmv at actual operating conditions.

Conclusions

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[23] Ibid, Table I-1.

BACT must be at least as stringent as the most stringent level required in a permit, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the BAAQMD BACT determination for natural gas-fired simple cycle combustion gas turbines, obtained from CARB's Guidance for Power Plant Sitting and Best Available Control Technology, reflects the most stringent CO emission limit. Therefore, BACT for CO emissions from natural gas-fired simple cycle combustion gas turbines is 6 ppmv @ 15% O_2. The proposed CO emission limit of 4 ppmvd @ 15% O_2 on a 3-hour average basis is more stringent than the level currently considered BACT, but is expected to be achievable in practice.

Volatile Organic Compounds

The BACT analysis performed for VOC control includes the following:

- Review of published BACT guidelines for natural gas-fired simple cycle combustion gas turbines;
- Review of recent BACT decisions for natural gas-fired simple-cycle gas turbines;
- Review of federal NSPS for natural gas-fired simple cycle combustion gas turbines; and
- Review of published prohibitory rules for natural gas-fired simple cycle combustion gas turbines.

Published BACT Guidelines

As discussed previously, published BACT determinations from the following agencies were reviewed to identify any previously established BACT guidelines:

- ARB;
- BAAQMD;
- SJVUAPCD; and
- SCAQMD.

The ARB's BACT guidance document for electric generating units rated at less than 50 MW[24] indicates that BACT for the control of POC emissions from stationary gas turbines rated at less than 50 MW used in electrical generation is 2 ppmvd @ 15% O_2.

ARB's BACT Clearinghouse contained SMAQMD determinations that specified an oxidation catalyst achieving an emission limit of 2.1 ppmv @ 15% O_2 as BACT for the following facilities:

- Carson Energy Group cogeneration plant in Sacramento, California; and
- Sacramento Cogeneration Authority cogeneration plant in Sacramento, California.

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[24] Ibid, Table I-1.

The BAAQMD's BACT guidelines specify that, for natural gas-fired simple cycle combustion gas turbines, a VOC limit of 2 ppmv @ 15% O_2 has been "achieved in practice." This BACT guideline was established in CARB's Guidance for Power Plant Sitting and Best Available Control Technology (June 1999).

The SJVUAPCD's BACT guidelines contained a determination for gas turbines rated at less than 50 MW with uniform load and without heat recovery. The SJVUAPCD concluded that a VOC exhaust concentration of 2.0 ppmv @ 15% O_2 constituted BACT that had been achieved in practice.

The SCAQMD database did not contain BACT guidelines for VOC emissions from natural gas-fired simple cycle combustion gas turbines.

Recent BACT Decisions

The ARB staff has prepared a draft table summarizing NOx emission control requirements and permitted emission levels for simple-cycle power plant gas turbines. This table, which includes information regarding limits for VOC, CO, PM_{10}, SO_2 and ammonia, shows that most of the recently-permitted simple-cycle gas turbine projects in California have been required to meet VOC BACT limits of 2 ppmvd @ 15% O_2 on a 1- or a 3-hour average basis. The most recent of these BACT determinations was made by the SJVUAPCD for the Modesto Irrigation District Ripon project, which also consists of GE LM6000 Sprint gas turbines equipped with water injection and SCR for NOx control. For this project, which has been approved by the District and is expected to be licensed by the CEC before the end of 2003, VOC BACT was determined to be 2 ppmvd @ 15% O_2 on a 3-hour average basis.

The SCAQMD database included a December 2001 determination for the Wildflower Energy Indigo power plant that BACT for VOC for a simple-cycle LM5000 Sprint gas turbine was 2 ppm on a 1-hour average basis.

Federal NSPS

The NSPS applicable to new natural gas-fired combustion gas turbines are found in Title 40 CFR Part 60 Subpart GG. This NSPS does not specify an emission limit for VOC.

District Prohibitory Rules

Published prohibitory rules from the BAAQMD, SMAQMD, SDCAPCD, SJVUAPCD, and SCAQMD were reviewed to identify the VOC standards that govern existing natural gas-fired simple cycle combustion gas turbines. None of the prohibitory rules for combustion gas turbines, discussed previously in Section IV.A.3, specify an emission limit for VOC. Generic prohibitory rules (i.e., not device specific) from each of these districts were also reviewed; none contain an emission limit for VOC.

Conclusions

BACT must be at least as stringent as the most stringent BACT determination, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the BAAQMD BACT determination for natural gas-fired simple cycle combustion gas turbines, obtained from CARB's Guidance for Power Plant Siting and Best Available Control Technology, reflects the most stringent VOC emission limit. The BAAQMD established VOC emission limits of 2 ppmv @ 15% O_2 for natural gas-fired simple cycle combustion gas turbines. Therefore, BACT for VOC emissions from natural gas-fired simple cycle combustion gas turbines is 2 ppmv @ 15% O_2.

Particulate Matter Less Than 10 Microns in Diameter (PM_{10})

The BACT analysis performed for PM_{10} includes the following:

- Review of published BACT guidelines for comparable natural gas-fired simple cycle combustion turbines;
- Review of recent BACT decisions for natural gas-fired simple-cycle gas turbines;
- Review of federal NSPS for small natural gas-fired simple cycle combustion gas turbines; and
- Review of published prohibitory rules for comparable natural gas-fired simple cycle combustion gas turbines.

Published BACT Guidelines

Published BACT determinations from the following agencies were reviewed to identify any previously established BACT guidelines:

- ARB;
- BAAQMD;

- SJVUAPCD; and
- SCAQMD.

The ARB BACT Clearinghouse, as well as the BAAQMD and SJVUAPCD BACT guidelines, identify the use of natural gas as the primary fuel as "achieved in practice" for the control of PM_{10} for small simple cycle combustion gas turbines.

The ARB's BACT guidance document for electric generating units rated at less than 50 MW[25] indicates that BACT for the control of PM emissions from stationary gas turbines rated at less than 50 MW used in electrical generation is an emission limit corresponding to natural gas with fuel sulfur content of no more than 1 grain/100 standard cubic foot.

The SCAQMD database contained BACT determinations for the Los Angeles Department of Power and Water plant in Sun Valley, CA, and the Indigo Energy Facility in North Palm Springs, CA. The SCAQMD concluded that an exhaust PM_{10} concentration of 0.01 gr/dscf (equivalent to 11 lb/hr) constituted BACT.

Recent BACT Decisions

The ARB staff has prepared a draft table summarizing NOx emission control requirements and permitted emission levels for simple-cycle power plant gas turbines. This table, which includes information regarding limits for VOC, CO, PM_{10}, SO_2 and ammonia, shows that most of the recently-permitted simple-cycle gas turbine projects in California have been required to meet PM_{10} limits of 3.0 lb/hr.

Federal NSPS

Title 40 CFR Part 60 Subpart GG contains the applicable NSPS for combustion gas turbines. Section III.H previously identified the requirements of Subpart GG applicable to the proposed combustion gas turbine; Subpart GG does not regulate PM_{10} emissions.

District Prohibitory Rules

Published prohibitory rules from the District, SCAQMD, SJVUAPCD, SMAQMD, and SDCAPCD were reviewed to identify the PM_{10} standards that govern existing small natural gas-fired combustion gas turbines:

- BAAQMD adopted Rule 9-9 (Nitrogen Oxides from Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 9-9 does not regulate PM_{10} emissions.
- BAAQMD Regulation 6 (Particulate Matter and Visible Emissions) specifies a PM emission limit of 0.15 gr/dscf for sources of PM emissions.
- The SMAQMD adopted Rule 413 (Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 413 does not regulate PM_{10} emissions.
- SMAQMD Rule 404 (Particulate Matter) specifies a PM emission limit of 0.1 gr/dscf for sources of PM emissions.

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[25] Ibid, Table I-1.

- SMAQMD Rule 406 (Specific Contaminants) specifies a PM emission limit of 0.1 gr/dscf @ 12% CO_2 for combustion sources.
- The SDCAPCD adopted Rule 69.3.1 (Stationary Gas Turbine Engines - Best Available Retrofit Control Technology) to limit NOx emissions from these devices. Rule 69.3.1 does not regulate PM_{10} emissions.
- SDCAPCD Rule 52 (Particulate Matter) specifies a PM_{10} emission limit of 0.1 gr/dscf for sources of PM emissions.
- SDCAPCD Rule 53 (Specific Air Contaminants) specifies a PM emission limit of 0.1 gr/dscf @ 12% CO_2 for combustion sources.
- The SJVUAPCD adopted Rule 4703 (Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 4703 does not regulate PM_{10} emissions.
- SJVUAPCD Rule 4201 (Particulate Matter - Concentration) specifies a PM emission limit of 0.1 gr/dscf for sources of PM emissions.
- SJVUAPCD Rule 4301 (Fuel Burning Equipment) specifies a PM emission limit of 0.1 gr/dscf @ 12% CO_2 for combustion sources.
- The SCAQMD adopted Rule 1134 (Emissions of Oxides of Nitrogen from Stationary Gas Turbines) to limit NOx emissions from these devices. Rule 1134 does not regulate PM_{10} emissions.
- SCAQMD Rule 404 (Particulate Matter - Concentration) specifies a PM emission limit of 0.0437 gr/dscf for sources of PM emissions.
- SCAQMD Rule 409 (Combustion Contaminants) specifies a PM emission limit of 0.1 gr/dscf @ 12% CO_2 for combustion sources.

Conclusions

BACT must be at least as stringent as the most stringent BACT determination, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the BAAQMD BACT guideline reflects the most stringent PM_{10} emission limit. The District established a requirement for the use of natural gas as the primary fuel to control PM_{10} emissions from combustion gas turbines. Therefore, the use of natural gas as the primary fuel source constitutes BACT for PM_{10} emissions from small simple cycle combustion gas turbines. Through the use of natural gas, the turbines are expected to be able to meet the proposed emission limit of 3.0 lb/hr per turbine.

Sulfur Oxides

The BACT analysis performed for SOx included the following:

- Review of published BACT guidelines for small natural gas-fired simple cycle combustion turbines;
- Review of recent BACT decisions for natural gas-fired simple-cycle gas turbines;
- Review of federal NSPS for small natural gas-fired simple cycle combustion gas

turbines; and

- Review of published prohibitory rules for small natural gas-fired simple cycle combustion gas turbines.

Published BACT Guidelines

Published BACT determinations from the following agencies were reviewed to identify any previously established BACT guidelines:

- ARB;
- BAAQMD;
- SJVUAPCD; and
- SCAQMD.

The CARB BACT Clearinghouse, as well as the BAAQMD and SJVUAPCD BACT guidelines, identify the use of PUC-quality natural gas or natural gas with a limit on the sulfur content (i.e., 1 grain/100 scf) as the primary fuel as "achieved in practice" for the control of SOx for small simple cycle combustion gas turbines. The two most recent BACT determinations in the SCAQMD did not indicate BACT for SOx.

Recent BACT Decisions

The ARB staff has prepared a draft table of NOx emission controls required for simple-cycle power plant gas turbines. This table, which includes information regarding limits for VOC, CO, PM_{10}, SO_2 and ammonia) showed that most of the recently-permitted simple-cycle gas turbine projects in California have been required to meet hourly SO_2 limits that correspond to fuel sulfur content limits of between 0.33 and 1.0 gr/100 scf.

Federal NSPS

Title 40 CFR Part 60 Subpart GG contains the applicable NSPS for combustion gas turbines. Section III.B previously identified the requirements of Subpart GG applicable to the proposed combustion gas turbine. A combustion gas turbine is subject to a SO_2 emission limit of 0.015% by volume (150 ppmv) @ 15% O_2. The NSPS also limits the sulfur content of fuel to 0.8% by weight.

District Prohibitory Rules

Published prohibitory rules from the BAAQMD, SJVUAPCD, and SCAQMD were reviewed to identify the SO_2 standards that govern existing gas turbines.

- BAAQMD Rule 9-9 (Nitrogen Oxides from Stationary Gas Turbines) is the BAAQMD's only prohibitory rule that specifically addresses gas turbines but does not limit SO_2 emissions. The BAAQMD adopted Rule 9-1 (Sulfur Dioxide) to limit SO_2 emissions from all sources. Rule 9-1 prohibits SO_2 emissions in excess of 300 ppm. No other BAAQMD Rule or Regulation contains a relevant prohibitory rule regulating either the sulfur content in the fuel or the emission of SO_2 from gas turbines.

- SJVUAPCD Rule 4703 (Stationary Gas Turbines) is the SJVUAPCD's only

prohibitory rule that specifically addresses gas turbines but does not limit SO_2 emissions. The SJVUAPCD adopted Rule 4301 (Fuel Burning Equipment) to limit SO_2 emissions from these devices. Rule 4301 specifies a SO_2 emission limit of 200 pounds per hour. The SJVUAPCD also adopted Rule 4801 (Sulfur Compounds) to limit emissions of sulfur compounds. Rule 4801 specifies a SO_2 emission limit of 0.2%, or 2,000 ppm.

- SCAQMD Rule 1134 (Emissions of Oxides of Nitrogen from Stationary Gas Turbines) is the SCAQMD's only prohibitory rule that specifically addresses gas turbines but does not limit SO_2 emissions. The SCAQMD adopted Rule 431.1 (Sulfur Content of Gaseous Fuels) to reduce SOx emissions from the burning of gaseous fuels in stationary equipment. Rule 431.1 specifies a sulfur limit of 16 grains/100 scf (as H_2S) in natural gas sold within the SCAQMD. The SCAQMD also adopted Rule 407 (Liquid and Gaseous Air Contaminants) to limit SO_2 emissions from all sources. Rule 407 specifies an emission limit of 2,000 ppm for sulfur compounds (calculated as SO_2).

Conclusions

BACT must be at least as stringent as the most stringent BACT determination, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the CARB database and BAAQMD and SJVUAPCD BACT guidelines reflect the most stringent SOx emission limit. These sources established a requirement for the use of natural gas as the primary fuel to control SOx emissions from combustion gas turbines. Therefore, the use of natural gas as the primary fuel source constitutes BACT for SOx emissions from small simple cycle combustion gas turbines.

Summary

The criteria that constitute BACT for the proposed natural gas-fired simple cycle combustion gas turbine are summarized in Table 8.1E-4 and compared against the design criteria for the proposed combustion gas turbine.

Table 8.1E-4
Summary of Emission Limits and BACT Requirements

Pollutant	BACT	Proposed Control Level
NOx	Emission Limit = 2.5 ppmv @ 15% O_2	Design Exhaust Concentration = 2.5 ppmv @ 15% O_2
CO	Emission Limit = 4 ppmv @ 15% O_2	Design Exhaust Concentration = 4 ppmv @ 15% O_2
VOC	Emission Limit = 2 ppmv @ 15% O_2	Design Exhaust Concentration = 2 ppmv @ 15% O_2
SOx	Natural gas fuel	Natural gas fuel
PM_{10}	Natural gas fuel	Natural gas fuel

APPENDIX 8.1F

Offset Listing

APPENDIX 8.1F

OFFSET LISTING

Table 8.1F-1
BAAQMD Emission Bank Status - San Francisco
Emission Reduction Credits Available (tons/yr)
December 10, 2003

No.	Location	Certificate Owner	POC	NOX	Restrictions
896	Potrero	Calpine Corp. & Bechtel Enterprises Hold	0.000	405.205	Limited to electric power production
740	Hunters Point	Pacific Gas and Electric Company	9.790	32.680	Limited to electric power production
767	Pacific Lithographic Co.	Midway Power, LLC	5.862	1.300	
382	1426 Donner Avenue	California Oils Corporation	0.195	0.000	
905	Louis Roesch Company	Waste Management of Alameda County	0.716	0.000	
714	Louis Roesch Company	Enron North America Corp.	1.000	0.000	
337	James H Barry Co	American Lithographers Inc.	4.230	0.000	Limited to printing industry
483	The Glidden Company	The Glidden Company	4.700	0.000	Limited to paint manufacturing
875	Colorfast Printing Co.	Cunningham Graphics a Subdiary of ADP	4.704	0.000	Limited to graphic arts industries
600	Treasure Island	U.S. Navy	0.550	3.210	
475	Treasure Island	U.S. Navy	0.300	0.130	
		Totals	32.047	442.525	
		Totals, eligible for use by SFPUC	18.413	442.525	

BAAQMD Emission Bank Status

Emission Reduction Credits Available (tons/yr)

December 10, 2003

(The link in the Certificate Owner column provides contact information for the sale of ERCs.)

No.	Certificate Owner	PM	POC	NOX	SO2	CO	NPOC	PM10
11	Hewlett-Packard Co; Printed Circuit Divsn						159.500	
17	Allied Corporation				182.900			
18	Rexam Beverage Can Company		31.100					
28	Carnation Company	3.700						
36	United Airlines						1.800	
37	Morton International Inc			0.400		0.400		
38	FMC Corporation						53.700	
39	FMC Corporation		5.800					
53	A O Smith Corporation		10.800					
57	Phillips 66 Company	3.600				4.900		
68	FMC Corporation		0.400					
69	FMC Corporation		1.000					
70	Chevron Products Company		29.300					
96	U.S. Navy		1.018					
112	Owens Corning	1.300	14.400	0.220		0.150		0.700
131	Phillips 66 Company - San Francisco Refinery		0.380					
132	U.S. Navy			0.390		0.340		
135	Gallagher & Burk; Inc							6.230
141	Phillips 66 Company - San Francisco Refinery		0.373					
142	Phillips 66 Company - San Francisco Refinery		0.340					
149	Varian Oncology Systems						12.250	
151	Lawrence Livermore National Laboratory						1.660	
155	U.S. Navy		0.065	1.878	10.660	0.939		0.375
157	Bay Area Air Quality Management District		1206.060	352.960				
160	National Semiconductor Corporation		1.747					
168	Martinez Refining Company		11.620					
172	Chevron Products Company							0.384
173	Varian Oncology Systems		0.235				4.469	
180	United Technologies Corporation		0.076				4.397	
181	Advanced Micro Devices Inc		10.880					

182	Chevron Research and Technology Co	0.070	0.039	0.700	0.008	0.003		
183	Chevron Research and Technology Co		0.310					
194	RMC Lonestar	0.730						0.440
195	RMC Lonestar	0.400						0.240
205	U.S. Navy						6.034	
207	Owens Corning	17.900	23.300	9.500		3.900		
215	Monsanto Company							0.067
218	New United Motor Manufacturing; Inc		78.830					
223	Chevron Products Company		60.122	20.674	1.047	9.129		5.370
227	HMT Technology Corporation		0.200				2.240	
232	American Lithographers Inc.		6.164	0.095		0.100		
239	IBM Corporation						24.370	
241	Dexter Hysol Aerospace; Inc		4.700					
251	Triangle Wire & Cable; Inc			0.594				
252	General Electric Co		0.003					
259	Burke Industries; Inc		3.026				24.850	
262	Lawrence Livermore National Laboratory						1.050	
265	Solectron Corporation		3.710				3.350	
266	Santa Rosa Memorial Hospital			0.970				0.300
270	Stanford University			17.300				
280	California Canners & Growers	0.800				6.000		
302	Chevron Products Company		7.948					
310	Trumbull Asphalt Company		8.900	0.400	25.900	24.200		4.200
325	New United Motor Manufacturing; Inc		20.790					
328	Crockett Cogeneration; A Cal Ltd Partnership		11.050	0.840		0.200		
329	Advanced Micro Devices Inc		9.615					
333	U.S. Navy		13.490					
337	American Lithographers Inc.		4.230					
350	Hewlett-Packard Company		3.290					
351	U.S. Navy		22.786				54.600	
360	Gallagher & Burk; Inc		0.200	0.170	0.170	0.530		0.180
370	Pacific Refining Company		1.000					
371	Zanker Road Resource Management;Ltd		0.650	10.700	0.770			
372	Pacific Refining Company		0.440	0.224				
381	Laidlaw Environmental Services, Inc		1.400				1.460	
382	California Oils Corporation		0.195					
385	Quantum Corporation						3.200	

387	Martinez Refining Company		0.096					
392	Richard Mariani	0.600				3.300		
410	IBM Corporation						13.980	
414	Intel Corporation		13.920				2.140	
415	Martinez Refining Company				15.100			8.920
423	Ciba Corning Diagnostics Corp		0.530					
424	Chevron Products Company		1.608					
425	Beckman Coulter						3.110	
428	Martinez Refining Company		6.288					
434	Genentech; Inc		0.384	6.646		7.798		2.660
443	Lawrence Livermore National Laboratory						0.121	
445	Stanford University		3.790	14.840				
446	Red Wing Co /California Div	0.070	0.052	0.419	0.002	0.083		0.091
452	Solectron Corporation		2.674					
465	Ball Metal Beverage Container Corporation			0.275				
475	U.S. Navy		0.300	0.130		0.420		0.300
477	U.S. Navy		7.911					
478	Central Contra Costa Sanitary District		0.581	2.243		30.937		
483	The Glidden Company		4.700					
486	U.S. Navy		3.440	1.210	1.200	2.710		0.980
487	Chevron Chemical Company	3.504		3.028				5.254
489	Chevron Products Company			71.400				
491	U.S. Navy		1.620	5.762	0.460	1.241	1.030	0.405
495	Phillips 66 Company - San Francisco Refinery	0.400	0.527		2.150	42.700		
501	U.S. Navy		0.315	8.432	0.135	9.001		0.563
503	U.S. Navy		0.354	4.342	0.347	0.935		0.305
505	New United Motor Manufacturing; Inc		18.470					
510	U.S. Navy		3.490	2.430	0.210	0.580	0.220	0.590
514	Owens Corning		6.457					
520	New United Motor Manufacturing; Inc		112.760					
525	Central Contra Costa Sanitary District		0.153	1.120		8.158		
529	U.S. Navy		2.880	14.750	1.430	11.470		3.710
531	Crown Cork & Seal Company		20.249	4.595		0.965		0.345
532	Martinez Cogen Limited Partnership			50.200				
538	New United Motor Manufacturing; Inc		131.900					
540	New United Motor Manufacturing; Inc		0.218					
541	Chevron Chemical Company		0.047				1.600	

543	Hanson Permanente Cement							25.074
545	U.S. Navy		2.495					
546	Alameda Reuse & Redevelopment Authority		29.970					
554	Lawrence Livermore National Laboratory						2.400	
555	U.S. Navy			1.050	0.020	0.890		0.110
557	U.S. Navy		0.650	9.090	0.140	8.160		0.700
559	U.S. Navy		0.340	2.110				
560	Criterion Catalysts Company LP		0.340					
561	Pechiney Plastic Packaging; Inc		1.249					
563	Owens Corning		1.245					
578	Chevron Chemical Company		0.212	1.802	0.046	0.357		0.570
580	Phillips 66 Company - San Francisco Refinery		1.290	21.230	4.190	16.140		6.450
581	Phillips 66 Company - San Francisco Refinery		3.170	6.880	0.010	5.780		0.200
583	WinCup Holdings;L P		0.426					
588	Chevron Chemical Company			31.771		2.069		
598	USS-POSCO Industries				0.140	0.790		0.700
600	U.S. Navy		0.550	3.210	0.060	8.430		0.760
602	Calpine Corporation	0.200	40.970	2.143		0.357		
603	Port of Oakland			2.450				
609	Martinez Refining Company				50.610			
613	Martinez Refining Company			89.783				
617	Chevron Products Company		68.898	8.790	0.473	7.449		1.514
619	Raisch Products					0.840		
640	New United Motor Manufacturing; Inc		27.940					13.630
643	Homestake Mining Company	87.530				86.970		
645	Calpine Corporation			107.900				
648	Emerald Packaging Inc						40.000	
656	Duke Energy Oakland LLC		324.810					
658	Calpine Corporation		10.000	32.900		14.380		
661	Calpine Corporation		31.750					
662	Calpine Corporation			73.620	46.300			
665	Calpine Corp. & Bechtel Enterprises Hold		22.778					
666	Calpine Corp. & Bechtel Enterprises Hold		15.518					
674	Calpine Corp. & Bechtel Enterprises Hold					9.797	0.669	
675	Calpine Corp. & Bechtel Enterprises Hold				18.285			
679	Calpine Corp. & Bechtel Enterprises Hold		45.800					
680	Calpine Corp. & Bechtel Enterprises Hold		4.400					

684	Stapleton - Spence		0.028	0.312	0.006	0.008	0.030	0.140
687	Calpine Corp. & Bechtel Enterprises Hold		43.819	0.581				
688	Calpine Corp. & Bechtel Enterprises Hold		52.270					
691	Burns Philp Food Inc.		0.001					
696	Siliconix; Incorporated						0.001	
697	Calpine Corp. & Bechtel Enterprises Hold		85.863					
699	Calpine Corporation			20.900				
704	Enron North America Corp.		5.868					
708	Exar Corporation						4.689	
709	Enron North America Corp.		17.367					
710	Midway Power, LLC		5.140					
712	Enron North America Corp.		8.816					
713	Enron North America Corp.		6.153					
714	Enron North America Corp.		1.000					
716	Calpine Corporation		0.200	11.660	0.040	1.130		0.670
718	Midway Power, LLC		44.995					
719	Midway Power, LLC		4.900					
720	Midway Power, LLC			48.962				
722	Catalytica Energy Systems Inc		0.011					
723	Catalytica Energy Systems Inc			0.015		1.632		
724	Calpine Corporation			7.100				
726	New United Motor Manufacturing; Inc			0.343				
729	Valero Refining Company - California		28.326					
730	Del Monte Foods		0.176	2.194	0.038	1.562		0.887
732	Calpine Corporation		45.000					
734	Catalytica Energy Systems Inc					10.424		
735	San Mateo Water Quality Control Plant		1.053	3.720	0.225	13.562		
740	Pacific Gas and Electric Company		9.790	32.680	1.070	12.930		13.530
741	Calpine Corp. & Bechtel Enterprises Hold			96.813	436.470	54.340		
744	Applied Biosystems		0.144	1.472	0.015	1.682		0.186
746	Stauffer Management Company		0.700			9.100	0.400	0.700
748	Zeneca; Inc.	0.200				0.200		
749	Calpine Corporation			13.670				
750	Calpine Construction Finance Co.;L.P.				4.120			
753	Valero Refining Company - California		8.658					
756	Mirant California	4.200	0.390	1.173		14.602		6.443
757	Gaylord Container Corp.		0.135					

758	Gilroy Foods, Inc.		0.203					
761	Hanson Permanente Cement							2.852
762	Midway Power, LLC		38.993					
763	Rexam Beverage Can Company		13.083					
765	Chevron Products Company			10.600	0.100	2.100		0.500
766	Chevron Products Company		65.300					
767	Midway Power, LLC		5.862	1.300				
769	Amdahl Corporation						5.120	
770	Dow Chemical Company		14.472					
773	Midway Power, LLC			21.000				
774	Conagra Energy Services; Inc.					1.800		1.000
777	Chevron Products Company		15.345					
778	Midway Power, LLC		0.086	1.564	0.009	1.308	0.036	0.119
780	Midway Power; LLC		2.880	4.960	0.030	4.880		0.390
782	Owens Brockway Glass Containers	11.200				11.520		
785	Philips Semiconductor						0.320	
786	Calpine Corporation		0.017	1.026				
787	Conagra Energy Services; Inc.		61.138	2.070	0.024	1.161		0.538
788	Gilroy Foods, Inc.		0.422	7.653	0.046	6.439		0.583
789	Calpine Corporation		15.856					
793	Amdahl Corporation						11.818	
798	Midway Power, LLC		0.148	2.691	0.016	2.261		0.205
800	Midway Power; LLC							1.197
812	Martinez Refining Company		19.400	13.800	0.100			
813	Ball Metal Beverage Container Corporation		8.692	3.571	0.021	2.999		0.271
819	USS-POSCO Industries	3.000		5.011	0.290	4.910		0.360
821	Waste Management of Alameda County							98.010
822	Calpine Corporation		1.029					
823	Crown Cork & Seal Company		71.000					
824	Crown Cork & Seal Company		4.500					
827	Tesoro Refining and Marketing Company		1.045					
830	Midway Power, LLC			171.000				
831	Mirant California		72.280	66.060		450.600		202.530
832	BP West Coast Products, LLC		0.578					
833	Valero Refining Company - California		80.000					
837	Valero Refining Company - California							3.463
839	Tesoro Refining & Marketing Company		0.319					

835	Calpine Corp. & Bechtel Enterprises Hold	0.210			0.030	1.650		
840	Calpine Corporation				0.090	2.610		
841	Calpine Corp. & Bechtel Enterprises Hold		46.930					
842	Fleischmann's Yeast		11.120					
843	Pacific Custom Materials, Inc.		1.127	17.786	22.635	17.779		3.069
844	Homestake Mining Company							1.222
846	Fleischmann's Yeast		0.106	0.670	0.012	0.569		0.147
847	Shell Chemical LP		6.590					
848	Myers Container Corporation		20.030				7.390	
849	Myers Container Corporation		10.787	0.559		0.112	4.850	0.028
850	Norcal Waste Systems		0.077	8.312	0.418	0.155		0.173
852	Shore Terminals - Selby		8.450	11.352				
854	Myers Container Corporation			0.316	0.002	0.265		0.024
856	Calpine Corporation		26.522					
805	United Airlines		33.285					
858	Midway Power, LLC		2.353					0.094
859	C & H Sugar Company; Inc					37.282		
860	City of Santa Clara dba Silicon Valley Power		5.000					
861	City of Santa Clara dba Silicon Valley Power			51.500				
862	Conoco Phillips				3.500			
863	Mirant California		5.300	247.500	130.179	114.000		25.270
865	City of Santa Clara dba Silicon Valley Power		6.500					
867	Chevron Products Company		1.573					
870	Burns Philp Food, Inc.		16.259					
871	LSI Logic Corporation		3.904				0.195	
873	Johns Manville Roofing Systems Group		1.074					
875	Cunningham Graphics a Subdiary of ADP		4.704					
876	ConocoPhillips		76.860					
878	Johns Manville Roofing Systems Group		5.474					0.308
879	BP West Coast Products, LLC		0.787					
880	Intel Corporation			28.130				
882	Valero Refining Company - California		5.987					
883	Valero Refining Company - California				2.687			
884	Martinez Refining Company		2.980					
885	Johns Manville Roofing Systems Group		1.521					
886	Johns Manville Roofing Systems Group		0.026	1.990	6.514	0.019		0.491
887	Chevron Products Company		39.777	36.225	133.812	485.471		31.134

889	United States Pipe & Foundry Company		23.400					
893	Tesoro Refining & Marketing Company		7.080					
894	United Airlines		45.000					
895	Calpine Corp. & Bechtel Enterprises Hold		80.325	49.864	1.030	33.320		7.265
896	Calpine Corp. & Bechtel Enterprises Hold			405.205	90.000	33.000		20.500
897	Owens Corning		1.995	39.800		32.600		6.100
898	Lesaffre Yeast Corporation		35.620					
899	SFPP; LP		2.178					
900	Chevron Products Company			1.027	0.060	0.537		0.312
901	Chevron Products Company		6.463					
902	Tesoro Refining & Marketing Company		4.829					
903	Ball Corporation		0.301					
904	Chevron Products Company		1.755	5.040	0.050	1.000		0.250
905	Waste Management of Alameda County		0.716					
906	Johns Manville Roofing Systems Group							0.043
907	Johns Manville Roofing Systems Group		1.399					
908	Johns Manville Roofing Systems Group		10.381					
909	Johns Manville Roofing Systems Group							0.390
910	Johns Manville Roofing Systems Group							0.005
911	Johns Manville Roofing Systems Group							0.325
912	Johns Manville Roofing Systems Group		0.099					0.325
913	Pacific Custom Materials, Inc.							2.030
914	Valero Refining Company - California				5.068			0.037
915	Tesoro Refining & Marketing Company			9.671	4.584	2.938		0.327
		140	**4023**	**2473**	**1206**	**1708**	**459**	**527**

APPENDIX 8.1G

Protocol for a Cumulative Impacts Analysis for the SFERP Facility

APPENDIX 8.1G

PROTOCOL FOR A CUMULATIVE IMPACTS ANALYSIS FOR THE SFERP FACILITY

Potential cumulative air quality impacts that might be expected to occur resulting from the construction and operation of the SFERP and other reasonably foreseeable projects are both regional and localized in nature. These cumulative impacts will be evaluated as follows.

Cumulative impacts from the SFERP could result from emissions of carbon monoxide, oxides of nitrogen, sulfur oxides, and directly emitted PM_{10}. To ensure that other projects that might have significant cumulative impacts in conjunction with the SFERP are identified, a search area with a radius of 6 km will be used for the cumulative impacts analysis.

Within this search area, three categories of projects with combustion sources will be used as criteria for identification:

- Projects that are existing and have been in operation since at least 2002.
- Projects for which air pollution permits to construct have been issued and that began operation after 2002.
- Projects for which air pollution permits to construct have not been issued, but that are reasonably foreseeable.

Projects that are existing and have been in operation since at least 2002 are already reflected in the ambient air quality data that has been used to represent background concentrations; consequently, no further analysis of the emissions from this category of facilities will be performed. The cumulative impacts analysis adds the modeled impacts of selected facilities to the maximum measured background air quality levels, thus ensuring that these existing projects are taken into account.

Projects for which air pollution permits to construct have been issued but that were not operational by 2002 will be identified through a request of permit records from the Bay Area AQMD. The search has been requested to be performed at two levels. Projects that had a permit to construct issued after January 1, 2000, will be included in the cumulative air quality impacts analysis. The January 1, 2000 date was selected based on the typical length of time a permit to construct is valid and typical project construction times, to ensure that projects that are not reflected in the 2002 ambient air quality data are included in the analysis. Projects for which the emissions change was smaller than 10 pounds per day will be assumed to be *de minimis*, and will not be included in the dispersion modeling analysis.

A list of projects within the area for which air pollution permits to construct have not yet been issued, but that are reasonably foreseeable, has also been requested from the BAAQMD staff.

APPENDIX 8.2A

CNDDB Species Lists, CNPS Electronic Inventory, USFWS Species List for San Francisco County

APPENDIX 8.2A

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Plants					
bent-flowered fiddleneck	*Amsinckia lunaris*	FSC, 1B	Coastal bluff scrub, cismontane woodland, valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms March-June.
Franciscan manzanita	*Arctostaphylos hookeri ssp. franciscana*	FSC, 1A	Coastal scrub (serpentinite)	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Evergreen shrub. Currently known only from the Presidio area. Power plant emissions can adversely impact serpentine-associated plant species. Blooms February-April
Presidio manzanita	*Arctostaphylos hookeri ssp. ravenii*	FE, CE, 1B	Chaparral, coastal prarie, coastal scrub/serpentine outcrop	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Evergreen shrub. Currently known only from the Presidio area. Blooms February-March.
San Bruno Mountain manzanita	*Arctostaphylos imbricata*	FSC, CE, 1B	Chaparral, coastal scrub/rocky	Low. Project area is industrial and lacks native soils.	Evergreen shrub. Currently known from only 5 occurrences on San Bruno Mountain. Blooms February-May.
Montara manzanita	*Arctostaphylos montaraensis*	FSC, 1B	Chaparral (maritime), coastal scrub	Low. Project area is industrial and lacks native soils.	Evergreen shrub. Currently known from only 10 occurrences in San Mateo County. J Blooms January-March.
marsh sandwort	*Arenaria paludicola*	FE, CE, 1B	Bogs and fens, marshes and freshwater swamps	Low. Project area is industrial and lacks native soils.	Perennial herb. Currently known only from occurrences in Mendocino and San Luis Obispo counties. Blooms May-August.
alkali milk-vetch	*Astragalus tener* var. *tener*	FSC, 1B	Playas, valley and foothill grasslands, alkaline vernal pools	Low. Project area is industrial and lacks native soils.	Annual herb. Last know collection in Bay Area in 1959. Blooms March-June.
San Francisco Bay spineflower	*Chorizanthe cuspidata* var. *cuspidata*	FSC, 1B	Coastal bluff scrub, coastal dunes, coastal prarie, coastal scrub/sandy	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms April-August.
robust spineflower	*Chorizanthe robusta var. robusta*	FE, 1B	Cismontane woodland openings, coastal dunes, coastal scrub/sandy or gravelly	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms April-September.
compact cobwebby thistle	*Cirsium occidentale* var. *compactum*	FSC, 1B	Chaparral, coastal dunes, coastal prarie, coastal scrub	Low. Project area is industrial and lacks native soils.	Perennial herb. Blooms April-June.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Presidio clarkia	*Clarkia franciscana*	FE, CT, 1B	Coastal scrub, serpentinite valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms May-July.
round-headed chinese houses	*Collinsia corymbosa*	FSC, 1B	Coastal dunes	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms April-June.
Point Reyes bird's-beak	*Cordylanthus maritimus* ssp. *palustris*	FSC, 1B	Saltwater marshes and swamps	Low. Project area is industrial and does not include wetland areas.	Hemiparasitic annual herb. Blooms June-October.
round-leaved filaree	*Erodium macrophyllum*	2	Cismontane woodland, valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms March-May.
fragrant fritillary	*Fritillaria liliacea*	FSC, 1B	Chaparral, cismontane woodland, valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Perennial herb Blooms February-April.
San Francisco gumplant	*Grindelia hirsutula* var. *maritima*	FSC, 1B	Coastal bluff scrub, coastal scrub, valley and foothill grassland/ sandy or serpentinite	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Perennial herb. Power plant emissions can adversely impact serpentine-associated plant species. Blooms August-September.
Diablo helianthella	*Helianthella castanea*	FSC, 1B	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Perennial herb. Blooms April-June.
Marin western flax	*Hesperolinon congestum*	FT, CT, 1B	Chaparral, valley and foothill grassland/serpentinite	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Annual herb. Power plant emissions can adversely impact serpentine-associated plant species. Blooms April-July.
Santa Cruz tarplant	*Holocarpha macradenia*	FT, CE, 1B	Coastal prairie, coastal scrub, valley and foothill grassland/often clay and sandy	Low. Project area is industrial and lacks native soils.	Annual herb. Last known population in San Francisco Bay Area eliminated by development in 1993. Blooms June-October.
Kellogg's horkelia	*Horkelia cuneata* ssp. *sericea*	FSC, 1B	Closed-cone coniferous forest, maritime chaparral, coastal scrub/sandy or gravelly, openings	Low. Project area is industrial and lacks native soils.	Perennial herb. Recorded occurrences from Crocker Hill may be the only ones in the San Francisco Bay Area. Blooms April-September.
beach layia	*Layia carnosa*	FE, CE, 1B	Coastal dunes, sandy coastal scrub	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms March-July.
San Francisco lessingia	*Lessingia germanorum*	FE, CE, 1B	Coastal scrub (remnant dunes)	Low. Project area is industrial and lacks native soils.	Annual herb. Currently known from only 4 occurrences at the Presidio and one on San Bruno Mtn. Blooms June-November.

APPENDIX 8.2A

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
rose linanthus	*Linanthus rosaceus*	FSC, 1B	Coastal bluff scrub	Low. Project area is industrial and lacks native soils.	Annual herb. Currently known from only one location near Pacifica. Blooms April-June.
white-rayed pentachaeta	*Pentachaeta bellidiflora*	FE, CE, 1B	Valley and foothill grassland (often on serpentine)	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Annual herb. Currently known from one location near Highway 280. Power plant emissions can adversely impact serpentine-associated plant species. Blooms March-May.
San Francisco popcorn-flower	*Plagiobothrys diffusus*	FSC, CE, 1B	Coastal prairie, valley and foothill grassland	Low. Project area is industrial and lacks native soils.	Annual herb. Blooms March-June.
hairless popcorn-flower	*Plagiobothrys glaber*	FSC, 1A	Alkaline meadows and seeps, coastal salt marshes and swamps	Low. Project area is industrial and does not include wetland areas..	Annual herb. Last confirmed record from 1954. Blooms March-May.
adobe sanicle	*Sanicula maritima*	FSC, 1B	Chaparral, coastal prairie, meadows and seeps, valley and foothill grassland/ clay, serpentine	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Perennial herb. Power plant emissions can adversely impact serpentine-associated plant species. Blooms February-May.
San Francisco campion	*Silene verecunda* ssp. *verecunda*	FSC, 1B	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/sandy	Low. Project area is industrial and lacks native soils.	Perennial herb. Blooms March-August.
Santa Cruz microseris	*Stebbinsoseris decipiens*	FSC, 1B	Broadleaved upland forest, closed-coned coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/open areas, sometimes on serpentine	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Annual herb. Power plant emissions can adversely impact serpentine-associated plant species. Blooms April-May.
California seablite	*Suaeda californica*	CE, 1B	Coastal salt marshes and swamps	Low. Project area is industrial and does not include wetland areas..	Evergreen shrub. Extripated from the San Francisco Bay Area. Blooms July-October.
saline clover	*Trifolium depauperatum* var. *hydrophilum*	FSC, 1B	Marshes and swamps, mesic and alkaline valley and foothill grasslands, vernal pools	Low. Project area is industrial and lacks native soils or wetland areas.	Annual herb. Blooms April-June.
San Francisco owl's-clover	*Triphysaria floribunda*	FSC, 1B	Coastal prairie, coastal scrub, valley and foothill grassland/usually serpentine	Low. Project area is industrial and lacks native soils. May be found on San Bruno Mountain.	Annual herb. Power plant emissions can adversely impact serpentine-associated plant species. Blooms April-June.
coastal triquetrella	*Triquetrella californica*	1B	Coastal bluff scrub, coastal scrub	Low. Project area is industrial and lacks native soils.	Moss.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Invertebrates					
Black abalone	*Haliotes cracherodii*	C	Marine	Low. Project will have no impact on local marine habitats.	None.
White abalone	*Haliotes sorenseni*	FE	Marine rocky reefs with kelp beds.	Low. Project will have no impact on local marine habitats.	Typically in deeper water than other California abalones.
Tomales isopod	*Caecidotea tomalensis*	CSC	Fresh water habitats.	Low. Project will have no impact on local marine habitats.	Endemic to the San Francisco Bay area.
Tryonia imitator	*mimic tryonia (=California brackishwater snail)*	none	Brackish saltwater marshes.	Low. Project will have no impact on local marine and marsh habitats.	None.
monarch butterfly	*Danaus plexippus*	none	Breeding habitat typically open fields and waterways with larval host, milkweed. Overwinter in eucalyptus groves along California coast and fir forest in Mexico.	Low. Project does not include any larval hosts, nectar sources, or trees.	Migrate north in April-June, south in September-October.
Bay checkerspot butterfly	*Euphydryas editha bayensis*	FT	Serpentine grassland with adult nectar sources and larval host plant(dwarf plantain and owls clover).	Low. Project area is industrial and lacks native soils or associated nectar sources. Found on San Bruno Mountain.	Power plant emissions can adversely impact serpentine-associated nectar plant species.
Mission blue butterfly	*Icaricia icarioides missionensis*	FE	Dunes and grassland areas with Lupinus host plant.	Low. Project area is industrial and lacks native soils or associated nectar sources. Found on San Bruno Mountain.	Restricted to 3 metapopulations including San Bruno Mountain in San Mateo County, Twin Peaks in San Francisco, and the vicinity of Skyline College in San Mateo County, California (Natureserve, 2003). Power plant emissions can adversely impact serpentine-associated nectar plant species.
San Bruno elfin butterfly	*Incisalia mossii bayensis*	FE	Wooded canyons with cliffs and rocky outcrops. Stonecrop host plant.	Low. Project area is industrial and lacks native soils or associated nectar sources. Found on San Bruno Mountain.	Current population restricted to San Bruno Mountain, Milagra Ridge, Montara Mountain, and Whiting Ridge (Natureserve, 2003). Power plant emissions can adversely impact serpentine-associated nectar plant species.
callippe silverspot butterfly	*Speyeria callippe callippe*	FE	Dry woodlands, foothill grasslands, and chaparral communities. Violet host plant.	Low. Project area is industrial and lacks native soils or associated nectar sources. Found on San Bruno Mountain.	Closest metapopulation found on San Bruno Mountain. Power plant emissions can adversely impact serpentine-associated nectar plant species.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Opler's longhorn moth	*Adela oplerella*	FSC	Serpentine grasslands with its larval food plant, California cream cups.	Low. Project area is industrial and lacks native soils or associated nectar sources. Found on San Bruno Mountain.	Power plant emissions can adversely impact serpentine-associated nectar plant species.
Sandy beach tiger beetle	*Cicindela hirticollis gravida*	FSC	Sandy and dune habitat.	Low. Project area is industrial and lacks native soils.	None.
Globose dune beetle	*Coelus globosus*	FSC	Sandy and dune habitat with scattered vegetation.	Low. Project area is industrial and lacks native dune habitat.	None.
Ricksecker's water scavenger beetle	*Hydrochara rickseckeri*	FSC	Highly aquatic. Thought to inhabit shallow water habitat in creeks, springs, and ponds.	Low. The project are does not include any aquatic habitat	None.
bumblebee scarab beetle	*Lichnanthe ursina*	FSC	Sandy and dune habitat.	Low. Project area is industrial and lacks native soils.	None.
Fishes					
tidewater goby	*Eucyclogobius newberryi*	FE, CSC	Tidal streams associated with coastal wetlands.	Low. Project area is industrial and does not include impacts to aquatic habitat.	None.
Sacramento splittail	*Pogonichthys macrolepidotus*	FSC	Primarily in San Francisco Bay Delta and lower Sacramento River. Historic range includes Sacramento River to Redding and San Joaquin River to Friant Dam. Associated with river backwaters, pools, sloughs, shallow bays, and slow moving shallow water with aquatic vegetation.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Peak spawning period March through May.
Delta smelt	*Hypomesus transpacificus*	FT	Endemic to the upper delta region of the Sacramento-San Joaquin River system.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Spawning varies yearly between December and July.
Longfin smelt	*Spirinchus thaleichthys*	FSC	Pacific coastal states from Alaska to Monterey, California. Found spawning in the Sacramento-San Joaquin River system in the Central Valley.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Extended spawning period may last from December into the early spring.

APPENDIX 8.2A
Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Coho salmon (central California coast ESU)	*Oncorhynchus kisutch*	FT, CE	Spawn in Central California Coastal rivers. Migrate out to marine coastal waters.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Migrate through San Francisco Bay.
Central California Coastal steelhead ESU	*Oncorhynchus mykiss*	FT	Spawn in Central California Coastal rivers. Migrate out to marine coastal waters.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Migrate through San Francisco Bay.
Winter-run chinook salmon	*Oncorhynchus tshawytscha*	FE	One of four races of chinook salmon found spawning in the Sacramento-San Joaquin River system. Migrate out to marine coastal waters.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Migrate through San Francisco Bay. Spawning typically begins in late December and can extend into April.
Central Valley fall/late fall-run chinook salmon	*Oncorhynchus tshawytscha*	C, CSC	Spawn in the Sacramento-San Joaquin River system. Migrate out to marine coastal waters.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Migrate through San Francisco Bay.
Amphibians					
California tiger salamander	*Ambystoma californiense*	FPT, CSC	Associated with vernal pools, stock ponds, and other ponds in grassland or open woodland areas of central California. The range includes the Central Valley and surrounding foothills from Colusa to Kern County. Take upland refuge in mammal burrows or crevices in winter.	Low. Project area is industrial and does not include vernal pool breeding habitat..	Migrate to nearby ponds for breeding in December-February. The Santa Barbara and Sonoma County populations are listed as FE.
Foothill yellow-legged frog	*Rana boylii*	FSC, CSC	Gravel or sandy bottom freshwater streams in woodland habitats.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Breeding season March to May.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
California red-legged frog	*Rana aurora draytonii*	FT, CSC	Associated with dense riparian areas with sufficient deep pool cover (stock ponds, wetlands, or idle stream channel pools) or slow moving water. Require aquatic habitat for breeding and utilize upland habitat for dispersal and cover. The range includes all valley drainages emptying into the Sacramento River from Shasta County south.	Low. Project area is industrial and does not include impacts to aquatic habitat.	Breeding season starts with the onset of rainfall from November-April. Tadpoles typically metamorphose between July and September.
Reptiles					
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	FE, CE	Associated with aquatic habitat such as wet meadows, marshes, and drainage ditches.	Low. Project area is industrial and does not include appropriate natural habitat.	Endemic to the San Francisco Bay Area.
California horned lizard	*Phrynosoma coronatum frontale*	FSC	Associated with a variety of habitat types but are most often found in dry shrubby open areas with gravel and sandy soils.	Low. Project area is industrial and does not include appropriate natural habitat.	Breeding in spring, hatchlings emerging July/August. Most active from March to October. Shelter in small mammal burrows.
Western pond turtle	*Clemmys marmorata*	CSC	The only native freshwater turtle in the Pacific Coast states. Highly aquatic and associated with riparian habitat including streams, rivers, sloughs, ponds, and artificial water bodies. Deep pools, basking sites, and aquatic vegetation are important habitat components.	Low. Project area is industrial and does not include impacts to appropriate aquatic or upland habitat.	Breeding season is typically between April to August. Eggs laid in an excavated chamber in upland habitat as much as 100 meters from the water. Hatchlings emerge in late summer or fall or over-winter in the nest to emerge the following spring. Adults hibernate in the winter by burying themselves in muddy bottoms underwater or in upland soil and vegetative litter.
Birds					
California brown pelican	*Pelecanus occidentalis californicus*	FE, CE	Coastal, pelagic, and offshore islands. Breeding colonies typically on offshore islands.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
double-crested cormorant	*Phalacrocorax auritus*	CSC	Found along the coast and inland water bodies. Typically nest colonial in trees or rocky areas near water.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Short-tailed albatros	*Diomedea albatrus*	FE	Open ocean. Island nester.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Nest limited to Torishima Island off of Japan. Occasional sightings off California coast.
California clapper rail	*Rallus longirostris obsoletus*	FE, CE	Salt marshes.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Endemic to the San Francisco Bay area.
Long-billed curlew	*Numenius americanus*	FSC, CT, MB	Winter habitat is primarily open land near, wetland, and agricultural fields in the Central Valley.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Winters in Central Valley. Power plant structures can increase the likelihood of avian collision.
bank swallow	*Riparia riparia*	FSC, CT	Typically in riparian areas or near water. Colonial nester in burrows in coastal bluffs, cliffs, and banks.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
California least tern	*Sterna antillarum browni*	FE, CE	Coastal. Nest on sandy beaches and mud flats.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
Bald eagle	*Haliaeetus leucocephalus*	FT, MB	Primary presence in California during winter migration. Associated with a variety of habitats. Nest sites typically found near water.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Platform nests in fork of tall tree or ledges. Migration season autumn through late winter. Power plant structures can increase the likelihood of avian collision.
Cooper's hawk	*Accipiter cooperii*	CSC	Woodland and otherwise forested areas.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
western snowy plover	*Charadrius alexandrinus nivosus*	FT, CSC	Coastal. Sandy beaches and mudflats.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
northern harrier	*Circus cyaneus*	CSC	Wetlands, marshes, and open fields.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
white-tailed kite	*Elanus leucurus*	FSC, FP, MB	Abundant in California's Central Valley where it is commonly associated with riparian and open habitats.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Typically breed between January and August. Their platform nests are located in trees or shrubs. Primarily a local resident and is known to form communal roosts in the fall and winter. Power plant structures can increase the likelihood of avian collision.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	FSC, CSC	Dense marsh and riparian vegetation.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
Loggerhead shrike	*Lanius ludovicianus*	FSC, CSC, MB	Typically associated with open lowland and foothill scrub or riparian woodland habitats with adequate hunting perches.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Largely non-migratory and has been known to defend year-round territories. Nests are typically well-concealed and built in dense shrubs or trees. In California the breeding period typically begins in March and may extend into August. Power plant structures can increase the likelihood of avian collision.
Red knot	*Calidris canutus*	FSC	Coastal. Sandy beaches and mudflats.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
Vaux's swift	*Chaetura vauxi*	FSC, CSC	Woodland areas near water. Old growth coniferous and deciduous forest. Cavity nester.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
Black swift	*Cypseloides niger*	FSC, CSC	Woodland and riparian areas near water. Cliff nester, often behind waterfalls.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.
Little willow flycatcher	*Empidonax traillii brewsteri*	CE, MB	Associated with dense willow riparian vegetation.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Breeding May-September. Power plant structures can increase the likelihood of avian collision.
American peregrine falcon	*Falco peregrinus anatum*	FD, CE, MB	Typically found along mountain ranges, river valleys, and coast lines. Nests are simple scrapes and often located on cliff ledges or other platform surfaces.	Low. Project area is industrial and lacks biological resources to attract wildlife.	The breeding season typically begins in March. Power plant structures can increase the likelihood of avian collision.
Black oystercatcher	*Haematopus bachmani*	FSC	Typically found along rocky coasts and island areas.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Breeding typically begins in the late spring. Power plant structures can increase the likelihood of avian collision.

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Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Harlequin duck	*Histrionicus histrionicus*	FSC, CSC	Habitat includes a variety of aquatic areas in the northwestern US and Canada. Typically breeds along mountain streams and lakes. Non-breeding birds often found offshore.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Current distribution is rare in California. Power plant structures can increase the likelihood of avian collision.
Marbled godwit	*Limosa fedoa*	FSC	Breeding habitat typically found on the plains of Canada and the northern US. Non-breeding habitat includes coastal areas.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Significant migration along the California Coast. Power plant structures can increase the likelihood of avian collision.
Lewis' woodpecker	*Melanerpes lewis*	FSC, MB	Associated with open forest and oak woodlands. Found along riparian woodland corridors in Central California.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Cavity nester. Breeding season begins in mid-April. Power plant structures can increase the likelihood of avian collision.
Whimbrel	*Numenius phaeopus*	FSC	Nesting areas found in the tundra areas of the far north. Non-breeding habitat includes coastal areas.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Found along the Pacific Coast in the winter. Power plant structures can increase the likelihood of avian collision.
Ashy storm-petrel	*Oceanodroma homochroa*	FSC, CSC	Open ocean. Typically nests on islands.	Low. Project area is industrial and lacks biological resources to attract wildlife.	The Farallon Islands off of San Francisco are a crucial nesting location. Power plant structures can increase the likelihood of avian collision.
Black skimmer	*Rynchops niger*	FSC, CSC	Found along coastal areas and sometimes on inland freshwater areas. Primarily nest on protected sandy.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Primarily breeds in southern California. Power plant structures can increase the likelihood of avian collision.
Rufus hummingbird	*Selasphorus rufus*	FSC, MB	Occur in coniferous forest and riparian woodlands in the Central Valley with nearby nectar sources.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Typically breed in California March-July. Build cup nest in trees, shrubs. Power plant structures can increase the likelihood of avian collision.
Allen's hummingbird	*Selasphorus sasin*	FSC	Coastal chaparral, brushland, and forests edges.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Power plant structures can increase the likelihood of avian collision.

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Elegant tern	*Sterna elegans*	FSC, CSC	Found along coastal areas and occasionally on inland lakes. Typically nest on sandy beaches.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Currently know to breed in only five sites in southern California and northwestern Mexico. San Francisco is part of the non-breeding range. Power plant structures can increase the likelihood of avian collision.
California black rail	*Laterallus jamaicensis coturniculus*	FSC, CT	Found in fresh and salt water marshes.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Breeding populations are confined to a few remaining patches of habitat in central and southern California and western Arizona. Most substantial population found in the northern San Francisco Bay area.
Tricolored blackbird	*Agelaius tricolor*	CSC, MB	Associated with wetland areas with dense vegetation such as cattails, tule, bulrush. Forage in grassland and agricultural fields.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Nest in large colonies. Breeding season is April-July. However has also been reported breeding in October and November. Power plant structures can increase the likelihood of avian collision.
Western burrowing owl	*Athene cunicularia hypugaea*	FSC, CSC, MB	Habitats includes open grassland habitat with fossorial mammal burrows, often associated with ground squirrels.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Utilize small mammal burrows for cover and natal dens. Breeding season is typically from February through August. Power plant structures can increase the likelihood of avian collision.
Ferruginous hawk	*Buteo regalis*	FSC, MB	Associated with a variety of habitats but commonly found in open grassland areas.	Low. Project area is industrial and lacks biological resources to attract wildlife.	Uncommon winter resident in California. Breeding typically from March-July. Use large stick nests in trees. Power plant structures can increase the likelihood of avian collision.
Mammals					
Guadalupe fur seal	*Arctocephalus townsendi*	FT, CT	Rocky marine island shores.	Low. Project area is industrial and includes no impacts to local marine habitat.	Current breeding colonies restricted to islands off of Mexico. Females give birth May-July. Non-breeding seals occasionally observed on California Islands(California Department of Fish and Game 1990). Farallon Islands observation are the closest to the project area(Matthews and Moseley 1990).
Steller (northern) sea-lion (rookery)	*Eumetopias jubatus*	FT	Rocky shores of the Pacific Coast.	Low. Project area is industrial and includes no impacts to local marine habitat.	Breed May-August and birth the following year in May-June.

APPENDIX 8.2A

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Sei whale	*Balaenoptera borealis*	FE	Open ocean.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
Blue whale	*Balaenoptera musculus*	FE	Open ocean.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
Finback (fin) whale	*Balaenoptera physalus*	FE	Open ocean, typically 25 miles or more from shore.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
Right whale	*Eubalaena glacialis*	FE	Open ocean. Typically near shore.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
Sperm whale	*Physeter catadon (=macrocephalu s)*	FE	Pelagic, prefers deep water, sometimes found around islands or in shallow shelf waters (e.g., 40-70 m, Scott and Sadove 1997). Young are born in the water.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
Gray whale	*Eschrichtius robustus*	D	Mostly in coastal and shallow shelf waters. Young are born in lagoons and bays.	Low. Project area is industrial and includes no impacts to local marine habitat.	None.
southern sea otter	*Enhydra lutris nereis*	FT	Found in coastal waters near shore, typically near kelp beds.	Low. Project area is industrial and includes no impacts to local marine habitat.	Current distribution California coast, mainly from Santa Cruz to Pismo Beach. Births typically December-March.
salt-marsh harvest mouse	*Reithrodontomy s raviventris*	FE, CE	Found in salt and brackish tidal wetlands typically with dense vegetation (primarily pickleweed).	Low. Project area is industrial and includes no impacts to wetland habitat.	Small fragmented range in the marshes of the San Francisco Bay area.
Pacific western big-eared bat	*Corynorhinus townsendii townsendii*	FSC	Associated with coniferous and deciduous woodlands, chaparral, and riparian communities. Typically establish hibernation and maternity colonies in caves and human structures.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Mating in Fall-Winter. Young born in spring. In Central California, maternal colonies begin to break up in August.

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments
Greater western mastiff-bat	*Eumops perotis californicus*	FSC	Typically associated with arid, rocky areas in proximity to a water body. Roost in high cliffs, rock crevices, and buildings. Male and female bats share the same roost locations. These roost areas are presumed to be used year round.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Breeding in early spring. Young born June to August. Remains active through the winter with daytime torpor.
Long-legged myotis bat	*Myotis volans*	FSC	Associated with coniferous and deciduous woodlands, chaparral, and riparian communities. Typically hibernate in caves.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Breeding begins in late summer. Young aren't born until the following spring/summer. Large communal nurseries.
Yuma myotis bat	*Myotis yumanensis*	FSC	Associated with a variety of habitats, common in open forests and woodlands near water. Daytime maternal colonies and summer roosts in buildings, mines, caves, or crevices.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Mate in fall, give birth May to July. Presumed to be a local migrant and a winter hibernator.
Long-eared myotis bat	*Myotis evotis*	FSC	Found in a variety of forested and shrubland habitats. Will roost in buildings, hollow trees, mines, caves, and fissures.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Found throughout Western North America from British Columbia to Baja Mexico. Form small maternal colonies. Birth in summer.
Fringed myotis bat	*Myotis thysanodes*	FSC	Found in a variety of habitats including desert, grassland, and woodland communities. Roosts in caves, mines, rock crevices, buildings, and other protected sites. Nursery colonies often found in caves, mines, and buildings.	Low. The project site lacks roosting habitat. May roost in nearby structures.	Found throughout Western North America from British Columbia to southern Mexico. Mate in the fall and birth in the summer.
San Francisco dusky-footed woodrat	*Neotoma fuscipes annectens*	FSC, CSC	Forest and chaparral habitats.	Low. The project site lacks suitable natural habitat.	None.
Point Reyes jumping mouse	*Zapus trinotatus orarius*	FSC, CSC	Typically associated with thickly vegetated areas along streams, ponds, and marshes.	Low. The project site lacks suitable natural habitat.	None.

APPENDIX 8.2A

Special-Status Species Potentially Occurring in the General SFERP Project Region.

Common Name	Scientific Name[a]	Status[b]	Primary Habitat[d]	Potential Occurrence in Project Area	Comments

Notes:

[a] Scientific names are based on the following sources: AOU (1983); Jennings (1983); Zeiner *et al.* (1990a-c).

[b] Status. Status of species relative to the Federal and California State Endangered Species Acts and Fish and Game Code:

<u>Federal Status</u>

FE Federally listed as endangered.
FT Federally listed as threatened.
FPE Proposed endangered.
FPT Proposed threatened.
Candidate for listing as federally endangered or threatened. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.
FD Delisted from Federal threatened or endangered status.
FSC Federal Species of Special Concern. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.
MB Migratory Bird Treaty Act. of 1918. Protects native birds, eggs, and their nests.

<u>California Status</u>

CE State listed as endangered. Species whose continued existence in California is jeopardized.
CT State listed as threatened. Species that although not presently threatened in California with extinction are likely to become endangered in the foreseeable future.
CSC California Department of Fish and Game "Species of Special Concern." Species with declining populations in California.
FP Fully protected against take pursuant to the Fish and Game Code Sections 3503.5, 3511, 4700, 5050, 5515.

<u>Other Status</u>.

CNPS California Native Plant Society Listing (does not apply to wildlife species).
Plants, rare, threatened or endangered in California and elsewhere and are rare throughout their range. According to CNPS, all of the plants constituting List 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection) of the California Department of Fish and Game Code and are eligible for state listing.

SOURCE: California Dept. of Fish and Game, California Natural Diversity Database, December 2003; California Native Plant Society, Inventory of Rare and Endangered Vascular Plants of California, 2001.

APPENDIX 8.2B

Qualifications/Resumes of Field Surveyors

John Cleckler
Wildlife Biologist

CH2M Hill
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833
(916) 286-0395
(916) 920-8463 Fax
jcleckle@ch2m.com

Mr. Cleckler is a staff biologist in CH2MHILL's Sacramento Office. He has over 11 years of experience as a wildlife biologist. His experience includes performing general and special-status wildlife surveys using standard census techniques. His expertise include invertebrate and vertebrate natural history, vertebrate and invertebrate collecting methods, and identifying herpetile, bird, and mammalian species. He is familiar with state and federal regulations pertaining to both wildlife and wetlands. He prepares biological assessments and develops mitigation plans for Section 7 and 10(a) compliance under the Endangered Species Act.

Education

B.S. – Wildlife Biology, University of California at Davis, 1990

Professional Registrations

California Department of Fish and Game Scientific Collector's Permit

Distinguishing Qualifications

- Over eleven years experience working in ecosystems of the Western U.S.
- Experience in conducting pre-construction surveys and construction monitoring
- Experienced with monitoring horizontal directional drilling projects
- Experienced wetland delineator
- Experienced with preparing a variety of environmental permits

Selected Project Experience

Project Biologist, Metcalf Energy Center, Santa Clara County. Assisted in preparation of the Biological Resource Mitigation Implementation and Monitoring Plan, Resource Management Plan for the MEC Preserve, Fisher Creek Riparian Corridor Enhancement Plan, and Horizontal Directional Drilling Inadvertent Returns Contingency Plan. Managed monitoring efforts, document review, and prepared the environmental training program associated with the proposed Metcalf Energy Center.

Permitting, Walnut Energy Center, Turlock Irrigation District. Conducted site reconnaissance surveys and participated in the preparation of an Application for Certification to be submitted to the California Energy Commission.

Permitting, Modesto Electric Generation Station, Modesto Irrigation District. Conducted site reconnaissance surveys and participated in the preparation of a Small Power Plant Exemption to be submitted to the California Energy Commission.

Environmental Compliance Monitoring, Woodland Generation Station, Modesto Irrigation District. Provided biological monitoring to ensure compliance with conditions of site certification.

Team Leader, Teayawa Energy Center Desert Tortoise Surveys, Riverside County. Performed protocol desert tortoise surveys along proposed utility lines associated with the Teayawa Energy Center project. Assisted with preparation and review of the Biological Resources section of the EIS/EIR.

Biological Assessment, Casmalia Resources Landfill, Casmalia. Prepared biological assessment for hazardous waste remediation activities.

Fiber Optic Communications Project Construction Monitoring-Level (3) Communications. Managed construction monitoring of a 96.5-mile longhaul fiber optic communications line. Special focus was placed on avoidance of desert tortoise and Mohave ground squirrel habitat. Included development and implementation of an environmental awareness program.

Fiber Optic Communications Cable, Level (3) Communications. This project included a full range of biological permitting services in support of a nationwide fiber optic network installation project. This linear project included extensive segments transecting the Mojave Desert and the Central Coast regions. Approximately 75 percent of the buried fiber optic cable system was located within railroad right-of-ways. The remainder was located within highway right-of-ways and limited private lands. Responsibilities included environmental documentation and permitting, including wetland delineations, biological resource surveys, and agency consultation.

Bird/Wind Turbine Collision Study - California Energy Commission. Participated in a three-year California Energy Commission wind farm impact study near Tehachapi and Palm Springs, California. Conducted standard point count surveys and scavenger studies in order to determine the correlation between bird activity and bird mortality in and around wind farm developments. Also included coordination of the Palm Springs field station, field staff, data entry, and report writing.

Salmon Habitat Survey, California Department of Fish and Game. Surveyed salmon habitat in northwestern California using the General Aquatic Wildlife System. Recorded dimensional measurements, substrate channel types, riparian cover, and other stream features. Conducted electroshock fish sampling.

Desert Tortoise Survey, Los Angeles Department of Water and Power. Surveyed for, measured, weighed, marked, and relocated desert tortoises for a Los Angeles Department of Water and Power transmission line construction project. Constructed tortoise burrows and relocated eggs. Monitored construction activities and maintained client relations. Compiled a variety of daily reports. Surveys were conducted in accordance with Biological Opinion #1-6-90-F46.

Biological Tasks Lead, Wastewater Collection System Water Crossing Rehabilitation Project, Clearlake Oaks County Water District. Performed initial site reconnaissance and Prepared Streambed Alteration Agreement request. Managed biological monitor during construction.

Willow Flycatcher Survey, Federal Highways. Performed protocol willow flycatcher surveys within suitable riparian habitat adjacent to the proposed Blue Lakes Road improvement project.

Northern Spotted Owl Survey, Federal Highways. Performed protocol northern spotted owl surveys within suitable habitat adjacent to the proposed Hyampom Road improvement project.

Environmental Quality Assurance Program Environmental Monitor, San Luis Obispo County. Provided environmental monitoring for the Arco Quadalupe Dunes clean up and restoration project. Also provided consultation with project proponents regarding county permit limitation and requirements.

Environmental Quality Assurance Program Onsite Environmental Coordinator, Santa Barbara County. Managed a crew of environmental monitors on a fiber optics installation project throughout the County of Santa Barbara. Also provided consultation 3ith project proponents regarding he County permit limitation and requirements.

Desert Tortoise Monitoring, Mission Geoscience. Performed desert tortoise monitoring for exploratory drilling project near Barstow, California. Included presentation of an environmental awareness training program.

Sensitive Species Surveys, Coachella Valley Association of Governments. Performed focused surveys for a highway interchange expansion project. Focused surveys were conducted for Coachella Valley fringed-toed lizard, Coachella Valley Jerusalem cricket, Coachella Valley giant sand treader cricket, and Coachella Valley grasshopper.

Fish Creek Restoration Project, Vulcan Materials/CalMat Division. Performed a biological reconnaissance survey to determine impacts associated with the proposed realignment and restoration of Fish Creek.

Communications Facility Biological Resources Assessment, AT&T. Provided biological assessment of proposed and existing communication sites.

Sun Valley Biological Resources Assessment and Tree Inventory, Vulcan Materials/CalMet Division. Performed a biological reconnaissance survey to determine impacts of proposed mining expansion. Assessment included an inventory of native tree species.

Oro Grande Sand and Gravel Mine Restoration Project, Vulcan Materials/CalMet Division. Performed a biological reconnaissance survey to determine impacts associated with the reclamation strategy and proposed reclamation activities. Special focus was placed on determination of suitable desert tortoise habitat. Developed an environmental awareness program and a list of avoidance measures.

Montecito Ranch Biological Resources Assessment, Citation Homes. Performed a biological reconnaissance survey to determine impacts of proposed housing development. Special focus was placed on determination of suitable California gnatcatcher habitat.

Sawpit Dam Modification Project, County of Los Angeles Department of Public Works. Conducted riparian nesting bird surveys downstream of the Sawpit Reservoir. Also trapped southwestern pond turtles prior to de-watering of the reservoir.

Oak Valley Estates Biological Resources Assessment, The St. Clair Company. Performed a biological reconnaissance survey to determine impacts of proposed housing development. Also attended public hearings in support of the biological resources determination.

Southwestern Pond Turtle Translocation Study, County of Los Angeles Department of Public Works. Captured and translocated southwestern pond turtles from the San Gabriel and Morris reservoir sediment removal project area. Subsequently monitored the translocation success and turtle movement using radio telementry and GPS.

San Gabriel Reservoir Sluicing Project, Los Angeles Department of Water and Power. Conducted biological surveys associated with the San Gabriel and Morris reservoir sediment removal project.

Surveys including mammal transects, mammal scent stations, bird surveys, and amphibian night sit surveys.

San Joaquin Sanctuary Restoration Project, Irvine Water District. Conducted breeding birds surveys with special focus on the presence of least Bell's vireo. Monitored construction activities in the vicinity of critical habitat.

Communications Facility Biological Resources Assessment, Pacific Bell Wireless. Provided biological assessment of proposed and existing communication sites.

Balona Wetlands Restoration, Impact Sciences. Collected invertebrate core samples from stream channels.

Quarry at Wheeler Ridge Biological Mitigation Plan, Vulcan Materials/CalMet Division. Performed a biological reconnaissance survey to determine impacts of proposed mining expansion. Special focus was placed on determination of suitable San Joaquin kit fox and blunt-nosed leopard lizard habitat. A list of appropriate mitigation measures was compiled.

Desert Tortoise Survey and Construction Monitoring, Earth Tech, Corrections Corporation of America. Monitored California City Prison construction activity in desert tortoise habitat. Performed a tortoise clearance survey of a 67.5-acre exclosure. Processed and relocated tortoises. Surveys were conducted under a U.S. Fish and Wildlife Services (USFWS). Prepared and delivered a worker education program.

Desert Tortoise Mark/Recapture Survey, National Training Center. Conducted a mark/recapture survey for desert tortoises on two 1-square mile plots at the National Training Center, Fort Irwin. Surveys are being conducted under USFWS Regional Blanket Permit and subpermit.

Hawksbill Turtle Study, Queensland Department of Environmental Heritage, Australia. Assisted Ph.D. student with an intensive hawksbill turtle nesting biology study within the Great Barrier Reef.

Black-Naped Tern Monitoring, Queensland Department of Environmental Heritage, Australia. Monitored black-naped tern nests as part of an island ecology study in the Great Barrier Reef. Nest success and behavior was observed and recorded on a daily basis throughout the nesting season. These data were collected in conjunction with an ongoing sea turtle project funded by the Queensland Department of Environmental Heritage.

Burrowing Species of Special Concern Survey, Los Vaqueros Reservoir Project. Conducted surveys for burrowing species of special concern, including San Joaquin kit fox, burrowing owl, and American badger, for the Los Vaqueros Reservoir construction project near Livermore, California. Also constructed drift fences for California tiger salamander.

Vegetation Surveys/California State University Domingos Hills Foundation, National Training Center. Conducted vegetation surveys for a disturbance comparison study at the National Training Center, at Fort Irwin near Barstow, California. Used line transects, frequency frames, and biomass analysis methods.

Desert Tortoise Survey/Bureau of Land Management. Conducted desert tortoise population density surveys for the purpose of testing the one-km2 and one-hectare survey methods against the standard 60-day design. Measured, weighed, marked, and assessed health of tortoises.

Biological Survey, Weyerhaeuser. Surveyed old growth habitat for marbled murrelets and northern spotted owl on Weyerhaeuser tree farm property near Coos Bay and Roseville, Oregon. Surveys were conducted using standardized protocols. Identified occupied stands for murrelet. Performed night sits for

spotted owls. Assisted with the daytime follow up search to locate nestlings. Participated in the capture and banding of nestling spotted owls.

Mohave Ground Squirrel Survey, California Energy Commission. Trapped, handled, and installed pit tags on Mohave ground squirrels near China Lake, California.

Biological Resource Studies, Colorado State University, National Training Center. Monitored biological resources as part of the Army National Training Center's Land Condition and Trend Analysis Study at Fort Irwin near Barstow, California.

Biological Survey, Oregon Department of Fish and Wildlife. Surveyed proposed state timber sales for marbled murrelets in northwestern Oregon.

Guanaco Natural History Study, Iowa State University. Assisted Ph.D. student with ongoing study of guanacos (a camelid species) in Torres Del Paine National Park, Chile. Collected data for behavioral, radio telementry, and mortality studies. Captured and tagged newborn and adult male guanacos.

Desert Tortoise Survey, Kern River Gas Company. Surveyed for, handled, marked, and relocated desert tortoises for a pipeline construction project. Monitored construction activities and maintained client relations. Coordinated biology crews and completed a variety of daily reports. Surveys were conducted in accordance with Biological Opinion #1-1-89-F36R.

Fisheries Surveys, Los Padres Nation Forest. Conducted stream habitat typing along with electroshock fish sampling.

Ozone Damage Assessment, Sequoia and Kings Canyon National Parks. Assisted air quality specialist with assessment of ozone damage to pine species by way of chloretic mottle indices.

Peregrine Falcon Monitoring Survey, The Peregrine Fund. Monitored the hacking procedure release of three juvenile peregrine falcons in Great Basin National Park, Nevada. Conducted behavioral observations, predator defense, radio telemetry, and data recording. Compiled written report following release.

Bear Management, Sequoia and Kings Canyon National Parks. Assisted park biologists with black bear management program. Included educational presentations, incident reporting, and bear capture.

Workshops, Seminars, and Professional Training

- California Tiger Salamander Workshop – The Wildlife Society, 2003
- Giant Garter Snake Workshop – The Wildlife Society, 2003
- California Red-Legged Frog Workshop-The Wildlife Society, 2002
- Identification and Ecology of Sensitive Amphibians and Reptiles of the Central and Southern Sierra Nevada Workshop-The Wildlife Society, 2001
- Surveying, Monitoring, and Handling Techniques Workshop – Desert Tortoise Council, 1992, 1993, 1999, and 2000
- Basic Wetland Delineation Training – Wetland Training Institute, 1998
- Basic Tracking and Wilderness Awareness Training – Earth Skills, 1998

- Horizontal Directional Drilling Inspector Certification Seminar – North American Society for Trenchless Technology & California Department of Transportation, 2000 (certification received).

Memberships in Professional Organizations

- The Wildlife Society
- California Native Plant Society
- The Nature Conservancy

APPENDIX 8.3A

Resumes of Cultural Resources Staff

James C. Bard
Cultural Resources

Education

Ph.D., Anthropology, University of California, Berkeley (1979)
M.A., Anthropology, University of California, Berkeley (1976)
B.A., Anthropology, University of California, Berkeley (1974)

Related Experience

Dr. Bard is responsible for directing cultural resource management projects for CH2M HILL. He has 32 years of experience in prehistoric archaeology, cultural resource management and small business management. He has been extensively involved in the management of and/or participation in cultural resource investigations in compliance with the National Environmental Policy Act, the National Historic Preservation Act, and a variety of other federal cultural resource regulations. He has extensive experience in the implementation of cultural resource investigations to meet the requirements of the California Environmental Quality Act (CEQA) and the Washington State Environmental Policy Act (SEPA).

- **Woodland Generating Station 2, Modesto Irrigation District.** Provided cultural resources support in preparation of the SPPE for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, and recommending mitigation.

- **Cosumnes Power Plant, SMUD.** Provided cultural resources support in preparation of the AFC for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, and recommending mitigation.

- **San Joaquin Valley Energy Center, Calpine.** Provided cultural resources support in preparation of the AFC for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, and recommending mitigation.

- **East Altamont Energy Center, Calpine.** Provided cultural resources support in preparation of the AFC for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, preparation of a historic site evaluation, conducting presence/absence testing, and recommending mitigation.

- **Metcalf Energy Center, Calpine.** Provided cultural resources support in preparation of the AFC for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, preparation of a historic site evaluation, conducting presence/absence testing, and recommending mitigation.

- **Los Esteros Critical Energy Facility, Calpine.** Provided cultural resources support in preparation of the AFC for submittal to the CEC. Tasks include evaluation of applicable regulations, conducting field surveys, preparation of a historic site evaluation, conducting presence/absence testing, and recommending mitigation.

- **Delta Energy Center Project in Contra Costa County, California for Calpine/Bechtel, San Francisco, California.** Principal investigator for the cultural resource assessment.

Delta Energy Center is a 700+ MW gas-fired power plant licensed by the California Energy Commission.

- **Pacific Gas and Electric Company's Tri-Valley Project, Amador and Livermore Valleys, California.** Principal investigator for cultural resource assessment. Surveys and siting studies for new electrical transmission generating capacity and delivery for Dublin, Pleasanton, and Livermore, California.

- **Principal investigator for cultural resource assessment for Pacific Gas and Electric Company's Jefferson to Martin Upgrade Project, San Mateo County, California.** Surveys and siting studies for new and replacement electrical transmission distribution for South San Francisco, San Mateo, and Burlingame, California.

- **Principal investigator for cultural resource assessment for Pacific Gas and Electric Company's Walnut Creek-Alamo-Danville21 kV Distribution Planning Area, 2005 Capacity Increase Project, Contra Costa County, California.** Survey and siting studies for new substations in Contra Costa County, California.

- **Principal investigator for Calpine Natural Gas Company's Rio Vista Pipeline Project/Rio Vista Gas Unit, Solano and Sacramento Counties, California.** Survey for new natural gas transmission line in central California.

- **Principal investigator for the cultural resource assessment of the Teayawa Energy Center Project in Riverside County, California for Calpine Corporation, Pleasanton, California.** Teayawa Energy Center is an 800 MW gas-fired power plant licensed by the California Energy Commission.

- **Principal investigator for the cultural resource assessment of the Rancho Seco Gas-Fired Power Plant Project near Sacramento, California for the Sacramento Municipal Utility District.** Rancho Seco Gas-Fired Power Plant is a 1000 MW combined cycle power plant licensed by the California Energy Commission.

Lori L Durio

Cultural Resource Specialist

Education

M.F.A., Historic Preservation and Architectural History, Savannah College of Art and Design, 1995
B.A., English and Political Science, Louisiana State University, 1985

Distinguishing Qualifications

- Qualified as a historian, an architectural historian, and a historic preservationist under the Secretary of the Interior's Historic Preservation Professional Qualification Standards as defined in 36 CFR 61

Relevant Experience

Ms. Durio is a planner based in CH2M HILL's New Orleans, Louisiana office. She has a diverse background in cultural resources. She has knowledge and contacts in the network of federal, state, and local agencies and non-governmental organizations that deal with cultural resources. These organizations include the Advisory Council on Historic Preservation, the National Park Service, National Conference of State Historic Preservation Officers, and the National Trust for Historic Preservation. She has worked for the Louisiana State Historic Preservation Office (SHPO) as an Architectural Historian managing cultural resource grants programs and the Historic American Buildings Survey/Historic American Engineering Record program. In her former capacity as the Principal Architectural Historian for the City of New Orleans, she worked closely with state and federal agencies on Section 106 Environmental Reviews and National Park Service projects, including conducting public hearings, drafting Memoranda of Agreement, and monitoring ongoing projects. She has extensive experience in cultural resource surveys. Her experience also includes materials conservation and preservation education.

Ms. Durio brings clients eight years of experience in cultural resources and provides experience dealing with cultural resource issues from local, state, and federal perspectives.

Representative Projects and Dates of Involvement

Cultural Resource Survey and Monitoring

Architectural Historian; Garden District Historic District; City of New Orleans; New Orleans, Louisiana; May 2002 to March 2003. Completed a survey of a National Historic Landmark District and research of neighborhood history and development, in preparation for its designation as a local historic district. This included assessment of all sites and structures within the designated boundaries for architectural, historical and cultural significance, compilation of all research and writing of complete report for presentation at public hearings and New Orleans City Council meeting.

Architectural Historian; Irish Channel Historic District; City of New Orleans; New Orleans, Louisiana; November 1998 to February 2000. Completed a survey of the National Register Irish Channel Historic District, performed research of neighborhood history and development, and prepared a final report, resulting in designation of the area as a local historic district. Included assessment of all sites and structures within the designated boundaries for

architectural, historical, and cultural significance. Presented findings and report at public hearings, City Planning Commission, and City Council meetings.

Architectural Historian; Riverview Historic District Survey; City of Atchison; Atchison, Kansas; February 2001 to November 2001. Performed a survey of this residential district on Kansas State Reconnaissance forms, including assessment of each structure for architectural significance and integrity, and for physical condition of property.

Architectural Historian; Commercial Street Historic District Survey; City of Atchison; Atchison, Kansas; November 2001 to May 2002. Performed a survey of this commercial district, assessing physical condition of each structure and making recommendations for their improvement and/or restoration, including ten prototypical building restoration programs.

Architectural Historian; Klamath River Hydroelectric Facilities FERC Relicensing; PacifiCorp; Klamath County, OR and Siskiyou County, CA; June 2003 to November 2003. As part of a FERC relicensing application, conducted survey fieldwork to document historic hydroelectric facilities and their associated sites and properties, culminating in post-field recordation on both Oregon Inventory of Historic Properties Section 106 forms and California State 523 Primary Record forms and Building, Structure, and Object forms.

Architectural Historian; Groundwater Recovery Enhancement and Treatment (GREAT) Program; City of Oxnard; Oxnard, CA; July 2003 to November 2003. Conducted a historic resources survey/inventory along a proposed pipeline route through both rural and developed land. The project included documentation of all located cultural resources on California State 523a Primary Record forms and Building, Structure, and Object forms, research and writing of a brief history of development in the area, and technical assistance on the Cultural Resources Inventory Report and Technical Report.

Architectural Historian; Berth 206-209 Container Terminal Reuse Project; Port of Los Angeles; Terminal Island, Los Angeles, CA; October 2003 to November 2003. Surveyed site planned for redevelopment to determine presence and eligibility of cultural resources, including research and writing of brief history of Terminal Island, CA, culminating in Cultural Resources section of the Environmental Impact Report.

Architectural Historian; Clinton Keith Road Extension Project; Riverside County Transportation Department; Riverside, CA; September 2003 to November 2003. Conducted a historic resources survey along a proposed road extension route, surveying standing structures as well as assisting with the archaeological survey, culminating in an Environmental Impact Report.

Cultural Resource Specialist; Cosumnes Power Plant Project; Sacramento Municipal Utilities District; Sacramento, CA; August 2003. Assisted with a Phase II archaeological investigation involving monitoring selected excavations, documenting discovered artifacts, and working with local Native American representatives.

National Register of Historic Places

Architectural Historian; Main Street Historic District Survey; City of Newton; Newton, Kansas; January 2000 to October 2000. Surveyed the Main Street District, performing research of history and development of community, and preparing the National Register of Historic Places nomination form, resulting in designation of two National Register districts.

Lori L Durio

Architectural Historian; Myers-Spalti Complex; R. Fifield, Architect, AIA; Houston, TX; April 2002 to September 2002. Researched and wrote the complete history and development of this multi-building urban industrial complex, and prepared the National Register nomination form.

Architectural Historian; Talkeetna Airport Improvements Project; Alaska Department of Transportation and Public Facilities and Federal Aviation Administration; Talkeetna, AK; September 2003 to November 2003. As part of a drainage improvement project for the Talkeetna Airport, conducted research for a determination of eligibility for the National Register of Historic Places for a historic railroad bridge, culminating in a written determination, including assessment of physical, historical and cultural significance of the railroad and the bridge structure.

Preservation Planning

Architectural Historian; USAF Integrated Cultural Resource Management Plan; United States Air Force Academy; Colorado Springs, CO; March 2003 to May 2003. Assisted with the research and writing of an Integrated Cultural Resource Management Plan for the USAFA. The plan focused on integrating the ongoing management of the facility and its significant cultural resources with the unique mission of the Academy. The project included developing a comprehensive, user-friendly document that will be used by Academy personnel, as well as coordinating with the Colorado SHPO and other interested agencies during development of the plan.

Architectural Historian; Fireboat *Ralph J. Scott* Preservation Plan; Port of Los Angeles; Los Angeles, CA; August 2003 to March 2004. Currently developing and writing a preservation plan for this historic marine vessel, a National Historic Landmark, for the Port of Los Angeles and the Los Angeles Fire Department. The project includes involving the public, the National Park Service, the CA SHPO, and other stakeholders in the community.

Section 106 Compliance

Architectural Historian; Louisiana ArtWorks; Arts Council of New Orleans; New Orleans, Louisiana; January 2000 to March 2003. Worked closely with the Arts Council of New Orleans, the National Endowment for the Arts, and the State Historic Preservation Office on Section 106 Environmental Review with adverse impact on historic structures, including assisting in the drafting of the resultant Memorandum of Agreement and Amended Memorandum of Agreement (AMOA). Monitored the project for compliance with the signed AMOA through project completion.

Experience Prior to CH2M HILL

Principal Architectural Historian; City of New Orleans, Historic District Landmarks Commission; New Orleans, Louisiana; 1997—2003. Conducted research and wrote reports on potential landmarks, historic districts, and other historic properties. She performed complete surveys of potential new local historic districts and prepared and delivered public presentations to the New Orleans and the Central Business District Historic District Landmarks Commissions and to the New Orleans City Council. Ms. Durio assisted applicants with historical accuracy and appropriateness of renovation and restoration projects. She assisted with outreach projects in the community, including informational presentations to the public. Ms. Durio worked with

preservation programs at local universities through student projects and internships. She served on the Housing Conservation District Review Committee to review proposed demolitions outside of local historic districts. She assisted the public citywide with architectural history queries and worked with other city agencies, the State Historic Preservation Office, and assorted federal agencies on Restoration Tax Credit projects and Section 106 Environmental Reviews.

Preservation Consultant; New Orleans, Louisiana; 1997—2003. Ms. Durio assisted property owners and developers with the federal Historic Preservation Tax Credit and the Louisiana Restoration Tax Abatement programs and served as liaison between property owners and State Historic Preservation Office. She performed architectural/historical research and rendered general restoration and renovation design assistance. Ms. Durio assisted in creating local historic district design guidelines for communities outside of New Orleans, especially for commercial areas. She performed architectural survey work for state and local governments and prepared National Register of Historic Places nomination forms, including surveys of potential districts as well as nominations for individual listings.

Adjunct Professor; University of New Orleans, College of Urban and Public Affairs; New Orleans, Louisiana; Summer 1999. Responsible for developing and teaching a course in nineteenth century architecture to both graduate and undergraduate students from diverse academic backgrounds.

Architectural Historian II; State of Louisiana, Office of Cultural Development, Division of Historic Preservation; Baton Rouge, Louisiana; 1995—1997. Responsible for coordination of all historic preservation grants, including Louisiana Main Street Program facade grants. She conducted site visits to render technical and design advice to owners of historic properties statewide. She monitored covenants and memoranda of agreement on previous grantees and assisted with Section 106 Environmental Review for potential impact on grantees and Main Street communities. She administered the Restoration Tax Credit program for projects in Main Street communities and the Historic American Buildings Survey/Historic American Engineering Record program, working with Schools of Architecture at universities throughout the state. Ms. Durio performed public presentations statewide to provide information on SHPO programs.

Center for Building Arts Education; Savannah College of Art and Design; 1991. Ms. Durio served as Conference Coordinator of Preservation Law and Economic Development Conference. Her responsibilities included implementation of seminars for field professionals, including assisting with development of brochures and educational materials.

City of Savannah, Park and Tree Department; Savannah, Georgia; 1990. For an internship through The Center for Preservation Research, Columbia University, Ms. Durio performed historical research and physical survey of Colonial Cemetery, culminating in a written report and including prototypical restoration, repair, and conservation of gravestones.

Professional Organizations/Affiliations

Association for Preservation Technology

National Trust for Historic Preservation

Lori L Durio

Preservation Resource Center of New Orleans

Society of Architectural Historians

Member, Board of Trustees, Louisiana Landmarks Society

Editor, *Preservation*, Louisiana Landmarks Society publication

Honors and Awards

2000. Iberville Award for Distinguished Contribution to the Central Business District (by *New Orleans* Magazine)

Publications and Presentations

2001. Urban Revitalization Tools. New Orleans, LA. Tulane Institute for Environmental Law and Policy Annual Conference.

2000. Revitalization of the Warehouse District Historic District. New Orleans, LA. American Planning Association Annual Conference.

Supplemental Information

Years Experience Prior to CH2M HILL: 8
CH2M HILL Hire Date: March 17, 2003

Employment History

City of New Orleans, Historic District Landmarks Commission, New Orleans, Louisiana, 1997–2003
State of Louisiana, Office of Cultural Development, Division of Historic Preservation, Baton Rouge, Louisiana, 1995–1997

Last Employee Update: 01/28/2004

APPENDIX 8.3B

Historic Resources Within the Project Vicinity

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Central Water Front District Resources

Street Address	Name/Property Type	Other District	Status Code
651 Illinois St.	Twigg Brothers Boat Building Shop/Industrial		3B
Pier 66	Boatyard Office/Industrial		5S3
555 Illinois Street	Bluepeter Building/Industrial		5S3
420 17th Street	Industrial		6Z1
1830 3rd Street	Mixed Use		4D2
701 16th Street	Industrial		6Z1
1900 3rd Street	Bethlehem Steel Co./Industrial		4D2
2085 3rd Street	Gilmore Oil Co./Industrial		4D2
550 18th Street	Industrial/Commercial		4D2
2075 3rd Street	Gilmore Oil Co./Industrial/Commercial		4D2
2065 3rd Street	Cresent Oil Co./Commercial		6Z1
2051 3rd Street	Vincent Morabito Building/Industrial/Commercial		5S3
2092 3rd Street	Jacob Knoblock Bldg/Mixed Use		4D2
603 Tennessee Street	Industrial		5S3
670-674 Tennessee Street	Frank Lester Building/Residential		5N
674-682 Tennessee Street	Residential		5N
690 Tennessee Street	Landini Building/Commercial		5S3
501-555 Minnesota Street	Industrial		4D2
590 Minnesota Street	Industrial		5S3
580-598 Indiana Street	Industrial		4D2
600 Minnesota Street	California Canneries Company/Industrial		3D
725 18th Street	Industrial		4D2
695 Minnesota Street	Industrial		5D1
601-645 Minnesota Street	Mixed Use		6Z1
721 Tennessee Street	Industrial		6Z1
2146-2148 3rd Street	Commercial		4D2
2150-2152 3rd Street	Now We're Cooking Inc./Mixed Use		4D2
2130 3rd Street	Industrial		4D2
2121 3rd Street	Seaside Oil Co./Industrial		4D2
548 20th Street, Bldg #101	Industrial		3B
460 20th Street, Bldg #102	Industrial		3B
SF Yard, Bldg #122	Industrial		3D
420 20th Street, Bldg #104	Industrial		3B
SF Yard, Bldg #105	Industrial		3D
SF Yard, Bldg #'s 113- 114	Industrial		3B

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Street Address	Name/Property Type	Other District	Status Code
	Central Water Front District Resources		
SF Yard, Bldg #'s 115-116	Industrial		3D
SF Yard, Bldg #117	Industrial		3D
SF Yard, Bldg #21	Industrial		3B
SF Yard, Bldg #111, 46	Industrial		3D
SF Yard, Bldg #38	Industrial		3D
SF Yard, Bldg #'s 109 & 52	Industrial		3D
SF Yard, Bldg #108	Industrial		3D
SF Yard, Bldg #119	Industrial		3D
SF Yard, Bldg #110	Industrial		3D
SF Yard, Bldg #103	Industrial		3D
SF Yard, Bldg #107	Industrial		4D5
SF Yard, Bldg #40	Industrial		3D
SF Yard, Bldg #2	Industrial		3D
SF Yard, Bldg #11	Industrial		3D
SF Yard, Bldg #6	Industrial		3D
SF Yard, Bldg #12	Industrial		3D
SF Yard, Bldg #36	Industrial		3D
SF Yard, Bldg #19	Industrial		3D
SF Yard. Bldg #14	Industrial		3D
SF Yard, Bldg #120	Industrial		3D
SF Yard, Bldg #50	Industrial		3D
SF Yard, Bldg #30	Industrial		4D5
SF Yard, Bldg #121	Industrial		3D
SF Yard, Bldg #49	Industrial		4D5
SF Yard, Bldg #66	Industrial		4D5
SF Yard, Bldg #16	Industrial		3D
SF Yard, Bldg #32	Industrial		3D
SF Yard, Bldg #25	Industrial		3D
SF Yard, Bldg #15	Industrial		3D
SF Yard, Bldg #23	Industrial		3D
SF Yard, Bldg #29	Industrial		4D5
SF Yard, Bldg #24	Industrial		6Z1
SF Yard, Fire Station	Industrial		6Z1
SF Yard, Bldg #64	Industrial		4D5
SF Yard, Crane Support	Industrial		6Z1

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Street Address	Name/Property Type	Other District	Status Code
	Central Water Front District Resources		
SF Yard, Slip #4, Cranes, Pier 70	Industrial		4D2
SF Yard, Pier 68 (Piers)	Industrial		4D5-7
SF Yard, Pier 68 (Slips)	Industrial		6Z1
SF Yard, Pier 70 (Piers)	Industrial		6Z1-7
SF Yard, Pier 70 (Slips)	Industrial		6Z1
SF Yard, Bldg #123	Industrial		3D
2289-2295 3rd Street	Mixed Use		4D2
2201-2203 3rd Street	White Candy Co./Industrial		4D2
2225 3rd Street	M. Levins & Sons Warehouse/Industrial		4D2
2255 3rd Street	Jos. Levins & Sons/Industrial		4D2
2290 3rd Street	Crocker-Anglo National Bank/Commercial		4D2
815-825 Tennessee Street	C.J. Figone & Son/Bowie Switch Company/Industrial		4D2
2230 3rd Street	Commercial		5S3 (5N)
724-728 20th Street	Commercial		6Z1
800 Indiana Street	AM Castle & Co. Office & Warehouse/Industrial		5S3
2350 3rd Street	Commercial		4D2
2342-44 3rd Street	Troy Hotel/Residential		4D2
2368 3rd Street	Margaret Keefe Boarding & Lodging/Mixed Use		5N
2476-2478 3rd Street	Residential		4D2
2420 3rd Street	Petrucello Barber Company/Commercial		4D2
2440 3rd Street	Bertsch Machine Works/Industrial		4D2
2430 3rd Street	Industrial		6Z1
2472 3rd Street	Cazeneuve Building/Industrial		6Z1
2400 3rd Street	Goodyear Rubber Company/Commercial		4D2
2360-64 3rd Street	Pellegrini Brothers Winery/Commercial		4D2
2301 3rd Street	American Can Company/Industrial		3B
2518-20 3rd Street	Mixed Use		3D
2524-26 3rd Street	Hard Knox Café/Mixed Use		5N
2530 3rd Street	Commercial		5S3 (5N)
2542-44 3rd Street	Mixed Use		5S3 (5N)
2604-08 3rd Street	Commercial		6Z1
2620 3rd Street	Industrial		4D2
2624-26 3rd Street	Commercial		4D2
2628-32 3rd Street	Mixed Use		4D2

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Central Water Front District Resources			
Street Address	**Name/Property Type**	**Other District**	**Status Code**
2636-38 3rd Street	Residential		3B
2642-46 3rd Street	Residential		6Z1
2501 3rd Street	American Can Company, Southern Extension/Industrial		4S1
1270 Indiana Street	McKay House/Industrial		5N
825 Minnesota Street		Dogpatch	7
900 Minnesota Street		Dogpatch	5D1
903 Minnesota Street		Dogpatch	5D1
905 Minnesota Street		Dogpatch	5D1
907 Minnesota Street		Dogpatch	5D1
909 Minnesota Street		Dogpatch	5D1
910-12 Minnesota Street		Dogpatch	7
911 Minnesota Street		Dogpatch	5D1
913 Minnesota Street		Dogpatch	5D1
914-16 Minnesota Street		Dogpatch	5D1
915 Minnesota Street		Dogpatch	5N
917-19 Minnesota Street		Dogpatch	5D1
918 Minnesota Street		Dogpatch	5D1
920-22 Minnesota Street		Dogpatch	5D1
921 Minnesota Street		Dogpatch	5D1
923 Minnesota Street		Dogpatch	5D1
924-26 Minnesota Street		Dogpatch	5D1
930-32 Minnesota Street		Dogpatch	5D1
934 Minnesota Street		Dogpatch	5D1
944-46 Minnesota Street		Dogpatch	5D1
945-47 Minnesota Street		Dogpatch	5N
948-50 Minnesota Street		Dogpatch	5D1
949-51 Minnesota Street		Dogpatch	5N
952-54 Minnesota Street		Dogpatch	5D1
958 Minnesota Street		Dogpatch	5D1
962-64 Minnesota Street		Dogpatch	5D1
966-68 Minnesota Street		Dogpatch	5D1
972-76 Minnesota Street		Dogpatch	5D1
1015-17, 1019-21 Minnesota Street		Dogpatch	5D1
1280 Minnesota Street	Potrero Compressed Yeast & Vinegar/Industrial		6Z1

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Street Address	Name/Property Type	Other District	Status Code
	Central Water Front District Resources		
1201 Minnesota Street	Lady's Choice Foods, Inc./Industrial		6Z1
1225 Minnesota Street	Crown Products Warehouse/Industrial		6Z1
1237 Minnesota Street	Charles D. Walker Mfg./Industrial		5D
1275 Minnesota Street	Crown Products Corporation/Industrial		4D2
1300 Illinois Street	The Pacific Telephone & Telegraph/Industrial		4D2
1215-75 Michigan Street	Eaton & Smith Plant/Sheedy Dryag/ Industrial		6Z1
1485 Illinois Street	W.C. Thompson Garage, Wash Rack, & Loading Dock/Industrial		5N
1401 Illinois Street	Hood Transportation/W.C. Thompson Buildings/Industrial		5N
2833 3rd Street	W.C. Thompson Office & Storage Warehouse /Industrial/Commercial		6Z1
2895 3rd Street	Eisele & Dondeno Marble Mill/Industrial		5N
2800 3rd Street	George R. Nelson Lumber Co./Industrial		5N
1000 25th Street	Industrial		4D2
2955 3rd Street	West Coast Fast Freight/Commercial		6Z1
800 Cesar Chavez Street	Industrial		6Z1
3003-95 3rd Street	Safeway Stores Inc./Industrial		4D2
1100 Cesar Chavez Street	U.S. Plywood Corp./Industrial		5S3
1301 Cesar Chavez Street	Cargill Inc. Office/Industrial		6Z1
1300 Cesar Chavez Street	Industrial		6Z1
3150 3rd Street	W.J. Lancaster Warehouse & Office/Industrial		6Z1
900 Marin Street	General Tire Company Office & Warehouse/Industrial		6Z1
888 Marin Street	Cobbledick-Kibbe Glass Co. Warehouse & Office/Industrial		6Z1
3201 3rd Street	Industrial		4S1
3240 3rd Street	F.E. Booth Company Inc. Plant/Industrial		4D2
Pier 84 and Copra crane	Industrial		4S1
20th & Illinois Street	20th & Illinois Street Paving/ Infrastructure		4D5
23rd Street Bridge	Infrastructure		3D
22nd Street Bridge	Infrastructure		3D
Tunnels No. 1 & 2	Bayshore Cut-Off/Infrastructure		3D
Third Street Lights	Infrastructure		4D5
Irish Hill	Other		3D
636 20th Street			4D2
724 20th Street	Dr. Frank M Close Medical Clinic		6Z1

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Central Water Front District Resources

Street Address	Name/Property Type	Other District	Status Code
700 22nd Street	Brady Saloon	Dogpatch	5D
714 22nd Street		Dogpatch	5N
718 22nd Street		Dogpatch	3S
726 22nd Street	March Hotel		5N
728-32 22nd Street		Dogpatch	5N
798 22nd Street		Dogpatch	7
800 22nd Street		Dogpatch	5D
806 22nd Street		Dogpatch	5N
807 22nd Street		Dogpatch	5D
808 22nd Street		Dogpatch	5N
812 22nd Street		Dogpatch	5D
816 22nd Street		Dogpatch	5N
820-24 22nd Street		Dogpatch	5D
825-29 22nd Street		Dogpatch	5D
833 22nd Street	Graham Fuel & Feed	Dogpatch	5D
834-40 22nd Street		Dogpatch	5D
845 & 849 22nd Street		Dogpatch	5D
894-98 22nd Street		Dogpatch	5N
900-02 22nd Street	J. Twomey & Sons Groceries	Dogpatch	5N
904 22nd Street	George Scharetg & Sons Dryage	Dogpatch	5D
1050 3rd Street	Warehouse –Bladium Roller Skate		6Y2
1830 3rd Street	The Viaduct Café		4D2
2300 3rd Street	Potrero Police Station		5B
2339 3rd Street	Factory		5S3
2500-02 3rd Street	Kentucky Hotel	Dogpatch	5D
2518 3rd Street			3D
3305 3rd Street	San Francisco Fire Station 25		7K
671 Illinois Street	Kneass Boatyard/Pier 66 Boatyard		5N
1201 Illinois Street	Station A		7
570 Indiana Street	Firebrick Supply Company Warehouse		4D2
1055 Marin Street	Reynolds Metals Company Building		4S1
605 Tennessee Street			5N
680 Tennessee Street	Frank Lester Buildings		5N
694 Tennessee Street		Dogpatch	5D
700 Tennessee Street		Dogpatch	5D

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Street Address	Name/Property Type	Other District	Status Code
	Central Water Front District Resources		
704 Tennessee Street		Dogpatch	5D
707 Tennessee Street		Dogpatch	5D1
712 Tennessee Street		Dogpatch	5D
718 Tennessee Street		Dogpatch	7J
724 Tennessee Street		Dogpatch	5D
729 Tennessee Street	Wesco Machinery Manufacturing Comp	Dogpatch	4D2
730 Tennessee Street		Dogpatch	5D
740 Tennessee Street	Kentucky Methodist Episcopal Church	Dogpatch	5D
748 Tennessee Street		Dogpatch	7
760 Tennessee Street		Dogpatch	7
780 Tennessee Street		Dogpatch	7
790 Tennessee Street		Dogpatch	7
800 Tennessee Street	Hulme & Hart Company	Dogpatch	5D
870 Tennessee Street		Dogpatch	7
900 Tennessee Street		Dogpatch	5D
901 Tennessee Street		Dogpatch	7
909 Tennessee Street	San Francisco Fire Department Station	Dogpatch	3S
950 Tennessee Street		Dogpatch	5N
970 Tennessee Street	Taylor Machine Shop	Dogpatch	5D
991 Tennessee Street		Dogpatch	6Z
993 Tennessee Street		Dogpatch	6Z
997 Tennessee Street		Dogpatch	5D
1001 Tennessee Street		Dogpatch	7
1002 Tennessee Street		Dogpatch	5N
1004 Tennessee Street		Dogpatch	5D
1005 Tennessee Street		Dogpatch	7
1006 Tennessee Street		Dogpatch	7
1007 Tennessee Street		Dogpatch	7
1008 Tennessee Street		Dogpatch	5D
1009 Tennessee Street		Dogpatch	7
1010 Tennessee Street		Dogpatch	5D
1011 Tennessee Street		Dogpatch	5D
1012 Tennessee Street		Dogpatch	5D
1014 Tennessee Street		Dogpatch	5N
1016 Tennessee Street		Dogpatch	5D

TABLE 8.3B-1
Historic Resources within the Project Vicinity

Street Address	Name/Property Type	Other District	Status Code
	Central Water Front District Resources		
1025 Tennessee Street		Dogpatch	7
1036 Tennessee Street		Dogpatch	5D
1042 Tennessee Street		Dogpatch	5D
1045 Tennessee Street		Dogpatch	5D
1049 Tennessee Street		Dogpatch	5D
1053 Tennessee Street		Dogpatch	5N
1059 Tennessee Street		Dogpatch	5D
1060 Tennessee Street	Irving Murray Scott School	Dogpatch	1S; SF Hist Lmk138
1063 Tennessee Street		Dogpatch	5D1
1067 Tennessee Street		Dogpatch	5D
1069 Tennessee Street		Dogpatch	7
1074 Tennessee Street		Dogpatch	5D
1077-79 Tennessee Street		Dogpatch	5D
1078 Tennessee Street		Dogpatch	5N
1100 Tennessee Street	Howley Liquors/Barsi Brothers Grocery	Dogpatch	5D
1101-03 Tennessee Street		Dogpatch	5D
1104-06 Tennessee Street		Dogpatch	5D
1105-07 Tennessee Street		Dogpatch	5D
1108-10 Tennessee Street		Dogpatch	5D
1109-11 Tennessee Street		Dogpatch	5D
1112-14 Tennessee Street		Dogpatch	5D
1113-15 Tennessee Street		Dogpatch	5N
1116 Tennessee Street		Dogpatch	7
1117-19 Tennessee Street		Dogpatch	7
1120-22Tennessee Street		Dogpatch	7
1121-23 Tennessee Street		Dogpatch	7
1124-28 Tennessee Street		Dogpatch	7
1127 Tennessee Street		Dogpatch	7
1133 Tennessee Street		Dogpatch	5D
1139 Tennessee Street		Dogpatch	5N
1159-63 Tennessee Street		Dogpatch	7
1167-69 Tennessee Street		Dogpatch	7
1185 Tennessee Street		Dogpatch	7

APPENDIX 8.3C

Agency Correspondence

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

December 8, 2003

James C. Bard
CH2Mhill
2300 NW Walnut Blvd.
Corvallis, Oregon 97330

Sent by Fax: 541-752-0276

RE: Proposed San Francisco Electric Reliability Project, San Francisco County

Dear Mr. Bard:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend other with specific knowledge. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

NATIVE AMERICAN CONTACTS
San Francisco County
December 8, 2003

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152
Mission San Jose , CA 94539
(510) 656-0787 - Voice
(510) 882-0527 - Cell
(510) 656-0780 - Fax
chochenyo@AOL.com
Ohlone/Costanoan
Bay Miwok
Plains Miowk
Patwin

Ella Rodriguez
PO Box 1411
Salinas , CA 93902
(831) 632-0490 - home
(831) 261-5827 - cell
Ohlone/Costanoan
Esselen

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister , CA 95024
(831) 637-4238
Ohlone/Costanoan

Trina Marine Ruano Family
Ramona Garibay, Representative
16101 5th Street
Lathrop , CA 95330
(510) 792-1642
(510) 673-5029 - Cell
Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Jakki Kehl
720 North 2nd Street
Patterson , CA 95363
(209) 892-2436
(209) 892-2435 - Fax
jakki@bigvalley.net
Ohlone/Costanoan

Thomas P. Soto
Howard S. Soto
P.O. Box 56802
Hayward , CA 94541
(530) 889-2444
sotoland@sbcglobal.net
(510) 733-6158 Fax
hss001@aol.com
Ohlone/Costanoan

Katherine Erolinda Perez
1234 Luna Lane
Stockton , CA 95206
(209) 462-2680
Ohlone/Costanoan
Northern Valley Yokut
Bay Miwok

Amah/MutsunTribal Band
Irene Zwierlein, Chairperson
789 Canada Road
Woodside , CA 94062
(650) 851-7747 - Home
(650) 851-7489 - Fax
(408) 364-1393 - Cell
Ohlone/Costanoan

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to cultural resources assessment for the proposed San Francisco Electric Reliability Project, San Francisco County.

NATIVE AMERICAN CONTACTS
San Francisco County
December 8, 2003

ah/Mutsun Tribal Band
Michelle Zimmer
4952 McCoy Avenue — Ohlone/Costanoan
San Jose , CA 95130
(408) 378-7705

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to cultural resources assessment for the proposed San Francisco Electric Reliability Project, San Francisco County.

CH2M HILL
2300 NW Walnut Blvd.
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Ella Rodriquez
P.O. Box 1411
Salinas, CA 93902

Dear Ella,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

CH2M HILL is assisting the San Francisco Public Utilities Commission prepare its Application for Certification for a 190 megawatt natural gas-fired power plant just southwest of Potrero Point in the City of San Francisco (see Figure X attached).

The project is located in mostly unsectioned lands in T 2S, R un known (San Francisco North, CA 1995 USGS 7.5 minute topographic maps).

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Thank you for your cooperation and assistance. We look forward to your earliest possible written reply.

Sincerely,

CH2M HILL

James C. Bard
Cultural Resource Specialist

Enclosure: Project Map

CH2M HILL
2300 NW Walnut Blvd
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97330-3538
P.O Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Katherine Erolinda Perez
1234 Luna Lane
Stockton, CA 95206

Dear Ms. Perez,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

CH2M HILL is assisting the San Francisco Public Utilities Commission prepare its Application for Certification for a 190 megawatt natural gas-fired power plant just southwest of Potrero Point in the City of San Francisco (see Figure X attached).

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December 11, 2003

184288.03.AF.FS

Mr. Andrew Galvan
The Ohlone Indian Tribe
P.O. Box 3152
Mission San Jose, CA 94539

Dear Andy,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, CA 95024

Dear Ms. Sayers,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Ramona Garibay, Representative
Trina Marine Ruano Family
16101 5th Street
Lathrop, CA 95330

Dear Ms. Garibay,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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December 11, 2003

184288.03.AF.FS

Ms. Jakki Kehl
720 North 2nd Street
Patterson, CA 95363

Dear Ms. Kehl,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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James C. Bard
Cultural Resource Specialist

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December 11, 2003

184288.03.AF.FS

Mr. Thomas P. Soto
Mr. Howard S. Soto
P.O. Box 56802
Hayward, CA 94541

Dear Mr. Soto,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Irene Zwierlein, Chairperson
Amah/Mutsun Tribal Band
789 Canada Road
Woodside, CA 94062

Dear Ms. Zwierlein,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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Cultural Resource Specialist

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CH2MHILL

December 11, 2003

184288.03.AF.FS

Ms. Michelle Zimmer
Amah/Mutsun Tribal Band
4952 McCoy Avenue
San Jose, CA 95130

Dear Ms. Zimmer,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

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Cultural Resource Specialist

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November 24, 2003

184288.03.AF.FS

Mr. Larry Myers
Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

Dear Larry,

Subject: San Francisco Public Utilities Commission – San Francisco Electric Reliability Project Application for Certification to the California Energy Commission

CH2M HILL is assisting the San Francisco Public Utilities Commission prepare its Application for Certification for a 190 megawatt natural gas-fired power plant just southwest of Potrero Point in the City of San Francisco (see Figure X attached).

The project is located in mostly unsectioned lands in T 2S, R unknown (San Francisco North, CA 1995 USGS 7.5 minute topographic map).

We would appreciate your checking the Sacred Lands Files to see if there are any culturally sensitive areas within the immediate project vicinity. We would also like to receive a list of MLD's appropriate for this area since we will attempt to contact local Indian groups to solicit their written input/concerns about the project.

Thanks again for your cooperation and assistance. We look forward to your earliest possible reply.

Sincerely,

CH2M HILL

James C. Bard

James C. Bard
Cultural Resource Specialist

Enclosure - Map

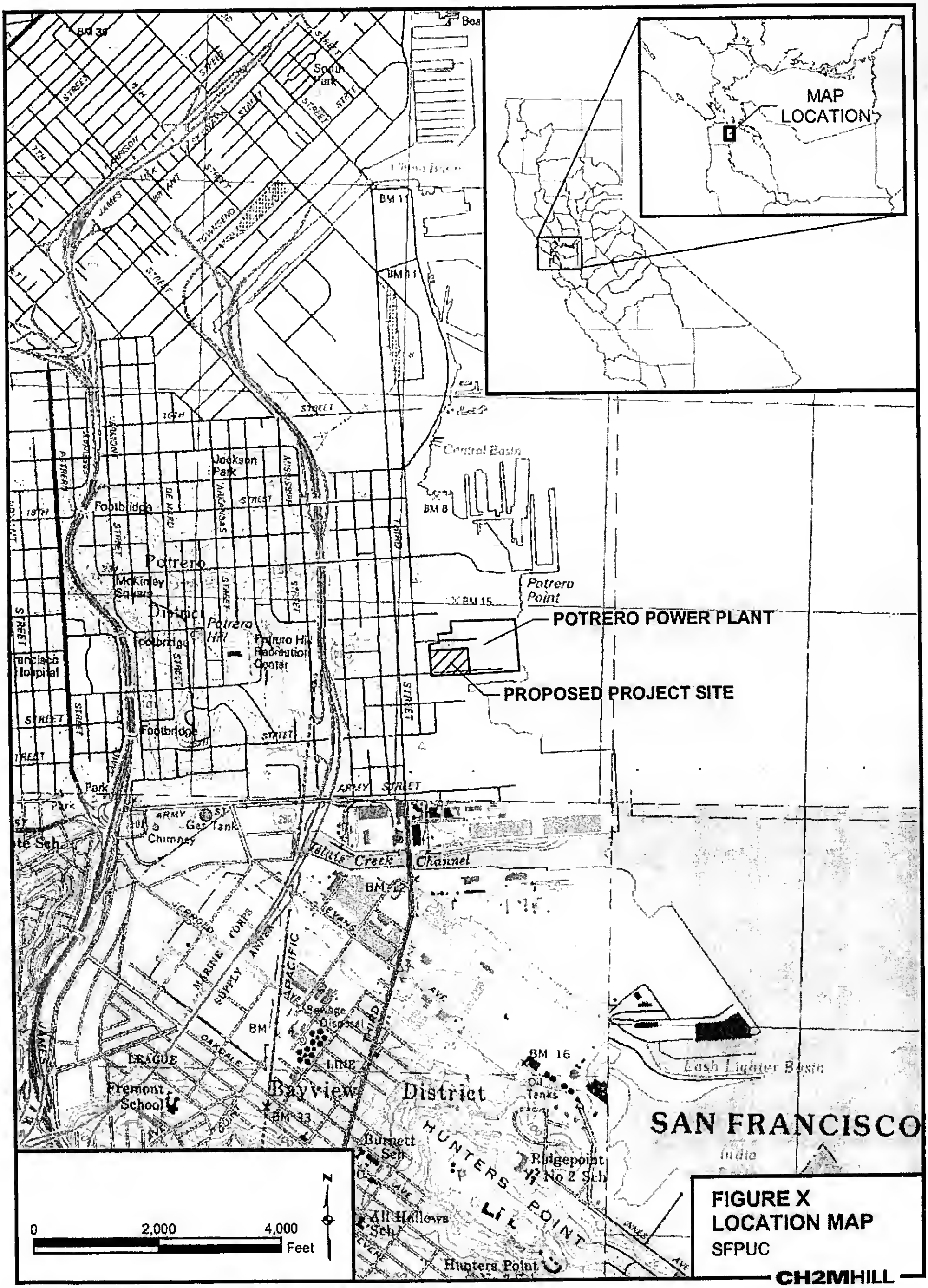

FIGURE X
LOCATION MAP
SFPUC
CH2MHILL

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CH2MHILL

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January 30, 2004

184288.03.AF.PS

Ms. Leigh Jordan, Coordinator
Northwest Information Center
Sonoma State University
1303 Maurice Avenue
Rohnert Park, CA 94928

Subject: San Francisco Electric Reliability Project

Dear Leigh:

Please conduct a limited records search for the San Francisco Electric Reliability Project as follows:

- Map all known/recorded archaeological sites (historic and prehistoric) within the marked purple-colored polygon (hereafter polygon).
- Map all surveys and studies conducted within the marked polygon.
- Provide bibliography of all surveys and studies conducted within the marked polygon.
- Provide copies of all known/recorded archaeological sites (historic and prehistoric) within the marked polygon.

Please conduct this work on an expedited basis and feel free to use our Federal Express Account number 0972-0236-2 to ship the new search results back to me here in Corvallis. Just be sure to include our project number (184288.03.AF.PF) on the Airbill Form. If you have any questions, please call me at 541-758-0235 (ext. 3662).

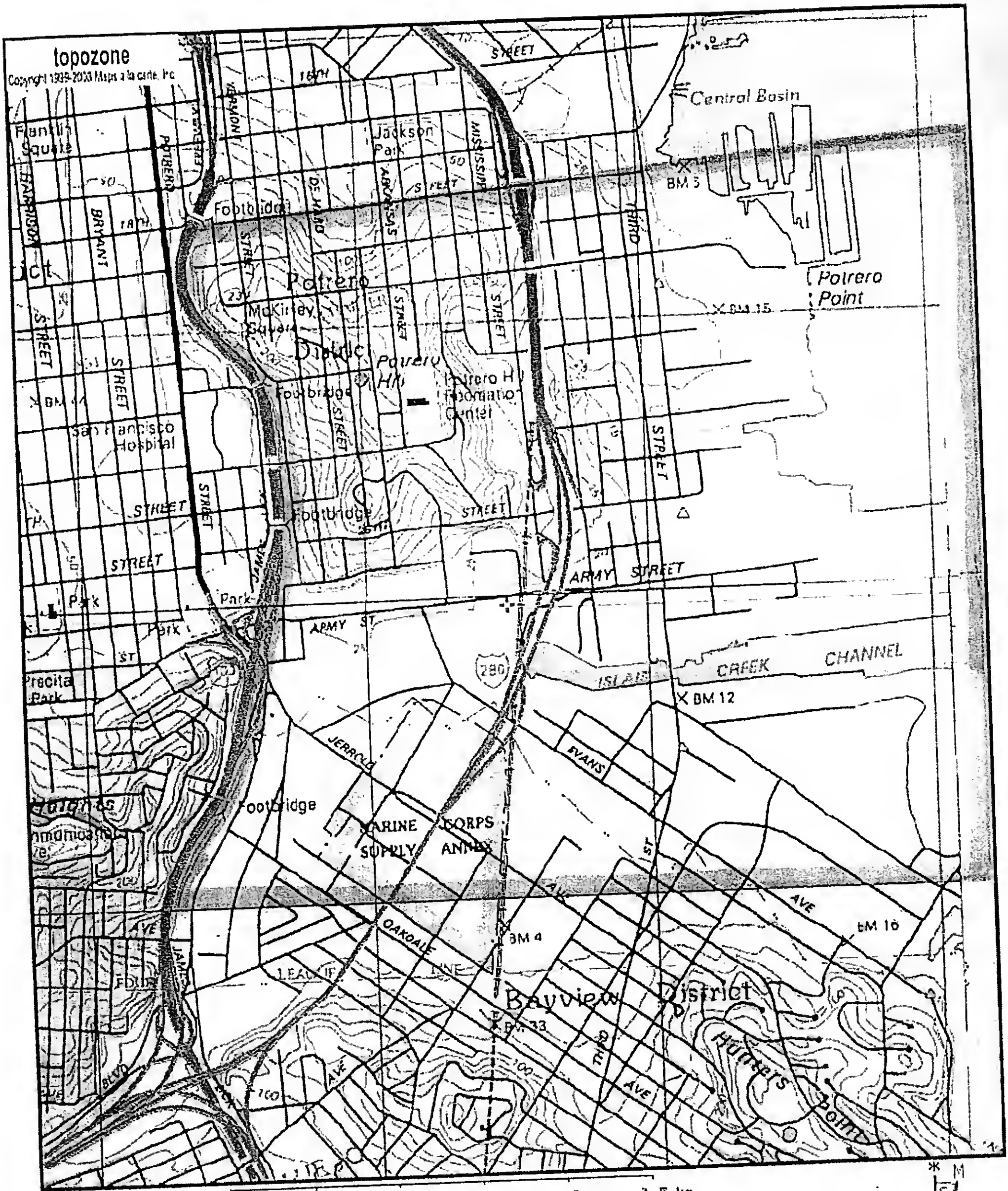
Sincerely,

CH2M HILL

Jim Bard

Jim Bard
Cultural Resources Specialist

Enclosure: Map



0 0.3 0.6 0.9 1.2 1.5 km

0 0.2 0.4 0.6 0.8 1 mi

Map center is UTM 10 553395E 4178231N (WGS84/NAD83)
San Francisco North quadrangle
Projection is UTM Zone 10 NAD83 Datum

M=15.182
G=0.371

APPENDIX 8.3D (CONFIDENTIAL)

CHRIS-annotated USGS Maps

APPENDIX 8.3D

CHRIS—Annotated USGS Maps (Confidential)

Appendix 8.3D, CHRIS—Annotated USGS Maps, was submitted separately under a request for confidentiality.

APPENDIX 8.8A

Environmental Justice

APPENDIX 8.8A

Environmental Justice

This report addresses compliance of the San Francisco Electric Reliability Project (SFERP) with the principles expressed in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994). The Executive Order requires that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects…on minority populations and low-income populations." Although both the California Energy Commission (CEC) and the Bay Area Air Quality Management District (BAAQMD) are in the process of developing an environmental justice policy, neither has yet issued guidance on compliance. The CEC, however, has issued the approach it uses in preparing its Environmental Justice Analysis. This report is generally consistent with that approach.

Key Phases in the Analytical Process

The CEC environmental justice analytical process has three key phases: (1) focused outreach to, and involvement of, the minority and low-income population in the decision making process; (2) a screening-level analysis to determine the potential for environmental justice issues; and, (3) if indicated by the screening results, a more detailed analysis of the relative distribution and intensity of impacts. These three phases and how they were conducted are discussed below.

Outreach and Involvement

The Executive Order requires agencies to ensure effective public participation and access to information. Consequently, a key phase of environmental justice analysis is outreach to the potentially affected minority or low-income population to discover issues of importance that may not otherwise be apparent. The project's outreach efforts fall into two categories: (a) Outreach efforts prior to filing an Application for Certification (AFC); and (b) Post-filing outreach.

Outreach Efforts Prior to Filing the Application for Certification

The following activities and actions were undertaken to ensure public awareness and involvement by the local community:

- On May 29, 2001, the City and County of San Francisco made a finding that:

  "The Energy Resources Conservation and Development Commission (California Energy Commission) has recognized Southeast San Francisco as a minority community entitled to environmental justice." (Ordinance 124-01)

- Between November 2001 and August 2002, City staff hosted nine neighborhood meetings and three meetings with representatives of the San Francisco business

community to solicit input and participation in public forums on energy policy (Resolution 827-02)

- In December 2002, the City approved an Electric Resource Plan that incorporated the community input from the above meetings.
- Met with Potrero Hill Power Plant Task Force Advisory Meeting, March 19, 2003
- Met with Southeast Facility Commission Meeting, March 26, 2003
- Introduced project to residents of the Southeast Sector in Partnership with SFPD Bayview District Police (R.O.S.E.S.), April 4, 2003
- Met with Potrero Hill Merchants Association on April 8, 2003
- Met with Potrero Hill Neighborhood Flea Market & Bazaar on April 12, 2003
- Met with Bayview Merchants on April 15, 2003
- Provided information tables at both: Earthday, Heron's Head Park, and Southeast Community Center Environmental Justice Meeting, April 26, 2003
- Made presentation about project to San Francisco Planning and Urban Research Association (SPUR) on May 7, 2003
- Made presentation about project to Building Owners & Managers Association (BOMA), May 15, 2003
- Attended Whitney Young Parents Association and answered questions, May 2, 2003
- Gave a 10-minute presentation to Bayview Hunters Point Project Area Committee (PAC), Health and Environment Subcommittee on May 21, 2003
- Answered questions from Bayview Merchants Association about the project, May 27, 2003
- Met with Bayview Rotary Club on May 28, 2003
- Met with Bayview Stakeholders Breakfast, Dago Mary's, June 4, 2003
- Made presentation to Dogpatch Neighborhood Association on June 6, 2003
- Introduction and brief summary of Electrical Reliability Project to attendees at Potrero Power Plant Task Force, June 26, 2003
- Met with Supervisor Sophie Maxwell and Intervenors/Interested Parties on July 16 and 30, and August 13, 2003
- Met with approximately 50 people at Potrero Neighborhood House on August 28, 2003
- Met with approximately 35 people at San Francisco Department of Public Health, September 4, 2003
- Met with approximately 40 to 50 people at Southeast Community Center, September 9, 2003

- Met with approximately 35 people at the California College of Arts & Crafts on September 20, 2003

Post Filing Outreach Efforts

As described in Section 4, Environmental Justice, the City intends to convene public workshops to solicit input in the development of a PM10 mitigation and community benefits package. Further, during the power plant licensing process, the California Energy Commission typically takes the following outreach actions:

- Mails written notice to all property owners within 1000 feet of the site and within 500 feet of any linear corridor
- Publishes notices in the local newspaper announcing public workshops and hearings
- Provides access to information by submitting copies of key documents to local libraries and providing materials via a web page
- Holds hearings and workshops in the local community
- Assigns a public advisor to assist the public in participating in the process

Screening-level Analysis

As shown in Table 8.8A-1, the population of a 6-mile-radius area surrounding the power plant site is predominantly minority, with the minority segment comprising 57.7 percent of the total population (see Figure 8.8A-1, and Attachment 8.8A-1). By comparison, according to the 2000 Census data, the minority population within San Francisco is only slightly lower at 56.36 percent. In this same 6-mile area, the low-income population is 11.3 percent of the total (see Figure 8.8A-2 and Attachment 8.8A-2) as compared to the City average of 12.7 percent.

TABLE 8.8A-1
Minority Population

	Total Population[a]	Minority Population[b]	Percent Minority	Percent Low Income
1-mile radius	11,802	4,991	42.3%	12.8%
6-mile radius	788,674	455,041	57.7%	11.3%
City and County of San Francisco	776,733	437,824	56.4%	12.7%
Bay Area[c]	6,783,760	3,391,556	50.0%	
State of California	33,871,648	18,054,858	53.3%	

Source: Potrero Unit #7 FSA, Socioeconomics Table 3: Minority Populations
[a] Source: Census 2000.
[b] Minority includes non-white and white-Hispanic populations.
[c] Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Based on this data, and determinations made both by the City of San Francisco and the CEC (CEC, 2002), a minority population exists within the affected area. Therefore, additional

analysis is warranted to determine if the project would have a "disproportionately high and adverse impact" on that population.

To assist in this analysis, the minority population within a 1-mile radius was analyzed. Figure 8.8A-3 shows each census block, whether the block contained greater than 50 percent minority population, and the number of residents living in that census block during the 2000 Census.

Detailed Examination of the Distribution of Impacts on Segments of the Population

This Application for Certification documents potential impacts of the project. Each subject area in Section 8 of the AFC provides a detailed analysis of the project. To the extent that significant adverse impacts may result, mitigation measures are proposed to reduce project impacts to a less than significant level.

The discussion below focuses on the issue areas of common concern for similar types of projects and those that have commonly been of concern in environmental justice complaints around the Bay Area. It summarizes the potential project impacts to the identified minority community(ies) and the effectiveness of the proposed mitigation measures. A more detailed analysis for each area is contained in Section 8 of the AFC.

Air Quality

Section 8.1 of the AFC addresses the potential impacts of the project on air quality. As described in that section, ambient air quality impact analyses for the facility were conducted to satisfy the CEC requirements for impacts from criteria pollutants (NO_2, CO, PM_{10}, and SO_2) and noncriteria pollutants during project construction and operation. To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards.

Maximum ground-level impacts due to operation of the SFPUC project are shown together with the ambient air quality standards in AFC Table 8.1-25. Using conservative assumptions, the results indicate that the SFPUC project will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state PM_{10} and state and federal $PM_{2.5}$ standards. For these pollutants, existing ambient air concentrations already exceed the state standards. Accordingly, the City intends to convene public workshops to solicit input into the development of a PM10 mitigation and community benefits package.

According to modeling performed for the project, emissions from the turbines will comply with air quality standards set by USEPA.

Public Health

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the non-criteria pollutant emissions from the facility. The SHRA estimated the excess offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse excess effects of non-carcinogenic compound emissions. Pollutant-specific unit risk factors are the estimated probability of a person contracting cancer as a

result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a 70-year lifetime. The locations of the maximum modeled pollutant concentrations are shown in Appendix 8.1C, Figure 8.1C-1. An evaluation of the potential excess non-cancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. The SHRA results for the SFERP are presented in Table 8.8A-2, and the detailed calculations are provided in Appendix 8.1C.

TABLE 8.8A-2
Screening Health Risk Assessment Results

Excess Cancer Risk to Maximally Exposed Individual:	0.02 in one million
Excess Cancer Risk at Nearest Residence:	0.01 in one million
Excess Cancer Risk at Nearest Workplace:	0.003 in one million
Excess Acute Inhalation Hazard Index:	0.03
Excess Chronic Inhalation Hazard Index:	0.002

Noise

Noise survey results show that the noise level of the most affected residential receptor (ML1) is primarily affected by vehicular traffic.

Noise from the project is predicted not to exceed 54 dBA at ML1 and ML4, the residential noise monitoring locations shown in Figure 8.5-1. This is consistent with the CEC's 5 dBA over background significance guideline and complies with LORS. No census blocks with more than 50 percent minority population will be affected by a significant increase in noise (i.e., more than a 5 dBA above existing levels).

Hazardous Materials

The project will use aqueous ammonia (29 percent) in the selective catalytic reduction (SCR) system to reduce NOx emissions. In performing an offsite consequence analysis, the worst-case accidental release scenario assumed the aqueous ammonia storage tank was punctured and the entire storage tank's contents was spilled into a catch basin or bermed area located beneath the tank. As shown by Figure 8.8A-4, the distance to the CEC's extremely protective 75 ppm ammonia concentration extends just off the project site's eastern boundary, which is on the Potrero Power Plant site. Additionally, ammonia concentrations expected to occur to the north, south, and west boundaries would be significantly lower than 75 ppm due to the ammonia storage tank's location at the eastern side of the project site (further away from public and residential receptors). The worst case accident is not expected to result in an offsite release greater than 5 ppm (the odor threshold of ammonia) to the north, south, or west of the site.

Conclusion

The screening-level environmental justice analysis indicated that a minority population exists in the surrounding project vicinity. Therefore, specific attention was given to the impact categories that are commonly of concern for this type of project, and those that have

historically been identified as being of concern—air quality, public health, noise, and hazardous materials—to determine if there were project impacts that adversely affected minority areas.

Air pollutant emissions and, hence, impacts on public health from the plant will be minimized by the use of best available control technology, the purchase of local emission offsets, and the development of a PM10 mitigation and community benefits package.

Noise emissions will comply with local ordinances and will not affect minority populations because of their distance from the plant.

Even during a worse-case scenario of a rupture of the ammonia storage tank, the ammonia gas would not escape in sufficient concentrations as to cause long-term health impacts.

The proposed project is consistent with the CEC's standards for environmental justice.

References

California Energy Commission. 2002. *Final Staff Assessment.* February 14.

Clinton, William. 1994. *Memorandum for the Heads of All Departments and Agencies; Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* Presidential Documents, Vol. 30, No. 6, 279-280. February 11.

Council on Environmental Quality. 1997. *Environmental Justice; Guidance Under the National Environmental Policy Act.* Council on Environmental Quality, Executive Office of the President, Washington, DC. December 10. Released July 1998.

Executive Order 12898. 1994. *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* Federal Register, Vol. 59, No. 32, 7629-7633. February 11.

U.S. Census Bureau. 2000 Census of Population.

U.S. Environmental Protection Agency, Office of Federal Activities. 1995. *Draft Guidance for Consideration of Environmental Justice in Clean Air Act 309 Reviews.* USEPA, Office of Federal Activities, NEPA Compliance Division, Washington, DC. July 19.

U.S. Environmental Protection Agency. 1998. *Guidance for Incorporating Environmental Justice in USEPA's NEPA Compliance Analyses.* USEPA, Office of Federal Activities, NEPA Compliance Division, Washington, DC. April.

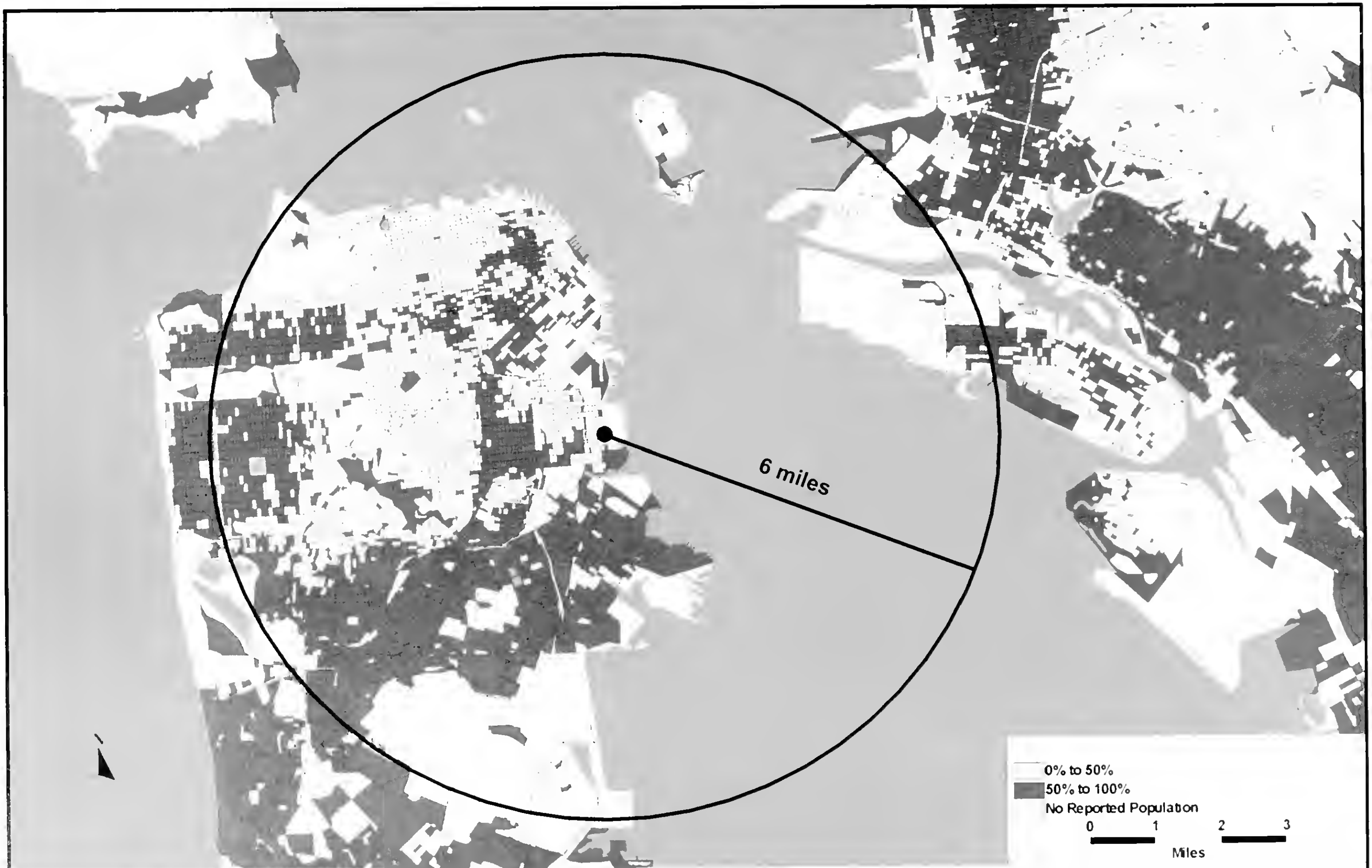
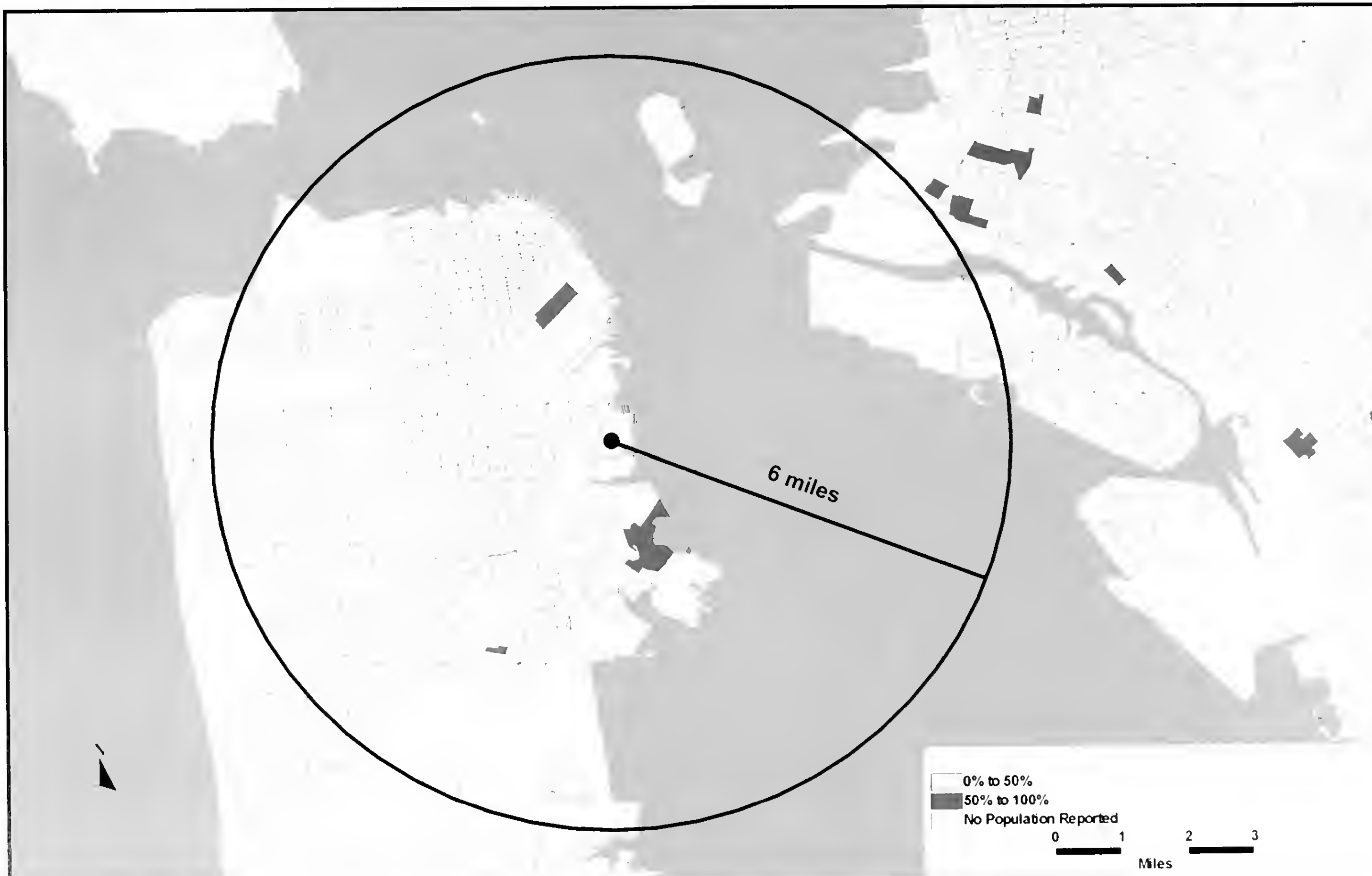


FIGURE 8.8A-1
PERCENT MINORITY BY
2000 CENSUS BLOCK GROUP
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

SOURCE: PB Power, Inc.

D012004005RDD 16 (3/2/04)

CH2MHILL



SOURCE: PB Power, Inc.

FIGURE 8.8A-2
PERCENT LOW-INCOME BY
2000 CENSUS BLOCK GROUP
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

CH2MHILL

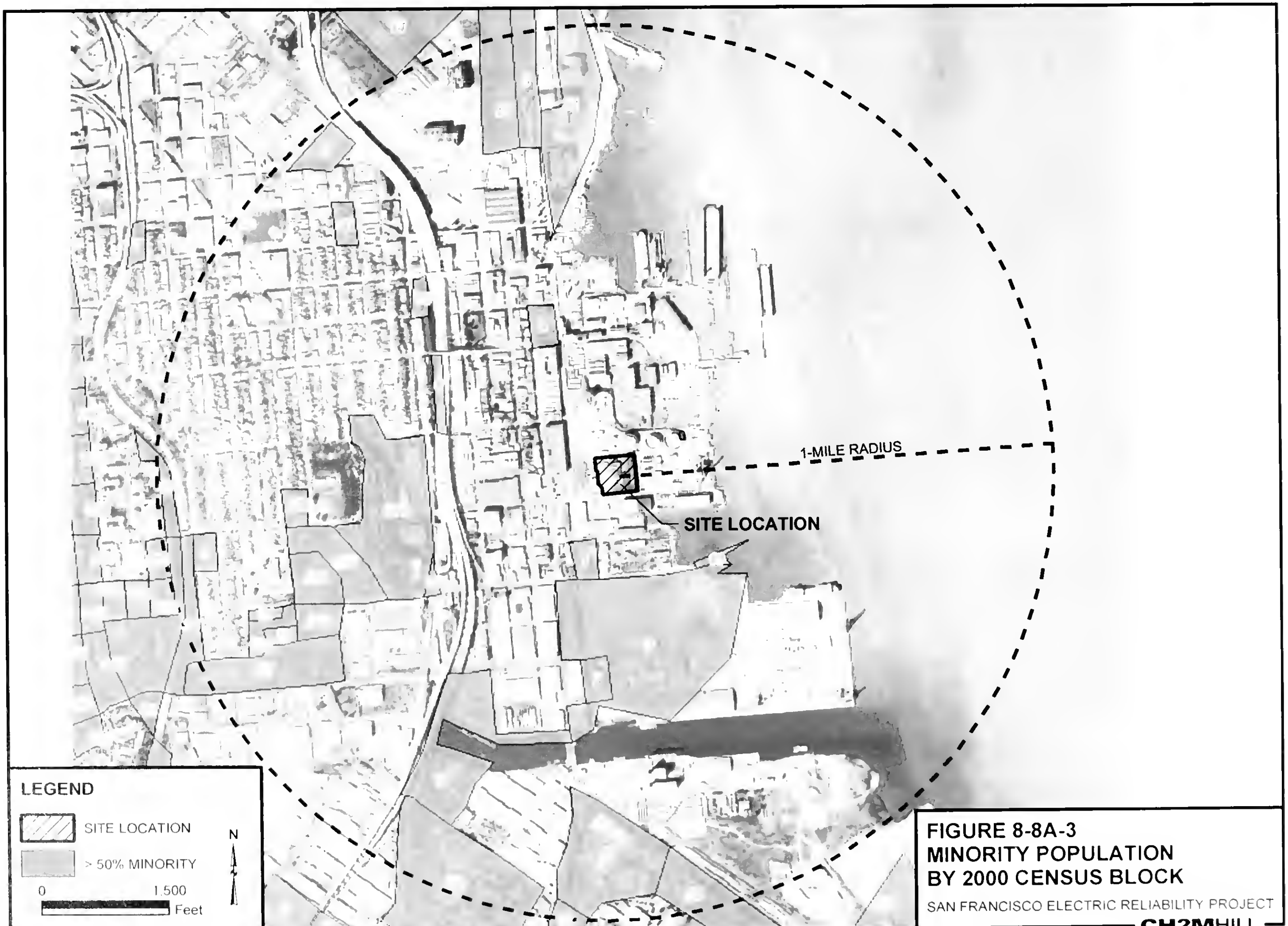


FIGURE 8-8A-3
MINORITY POPULATION
BY 2000 CENSUS BLOCK
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\SFPUC\MXDS\8_8A_3_POPULATION.MXD 8-8A-3_POPULATION.PDF 03/02/2004 13:39:39

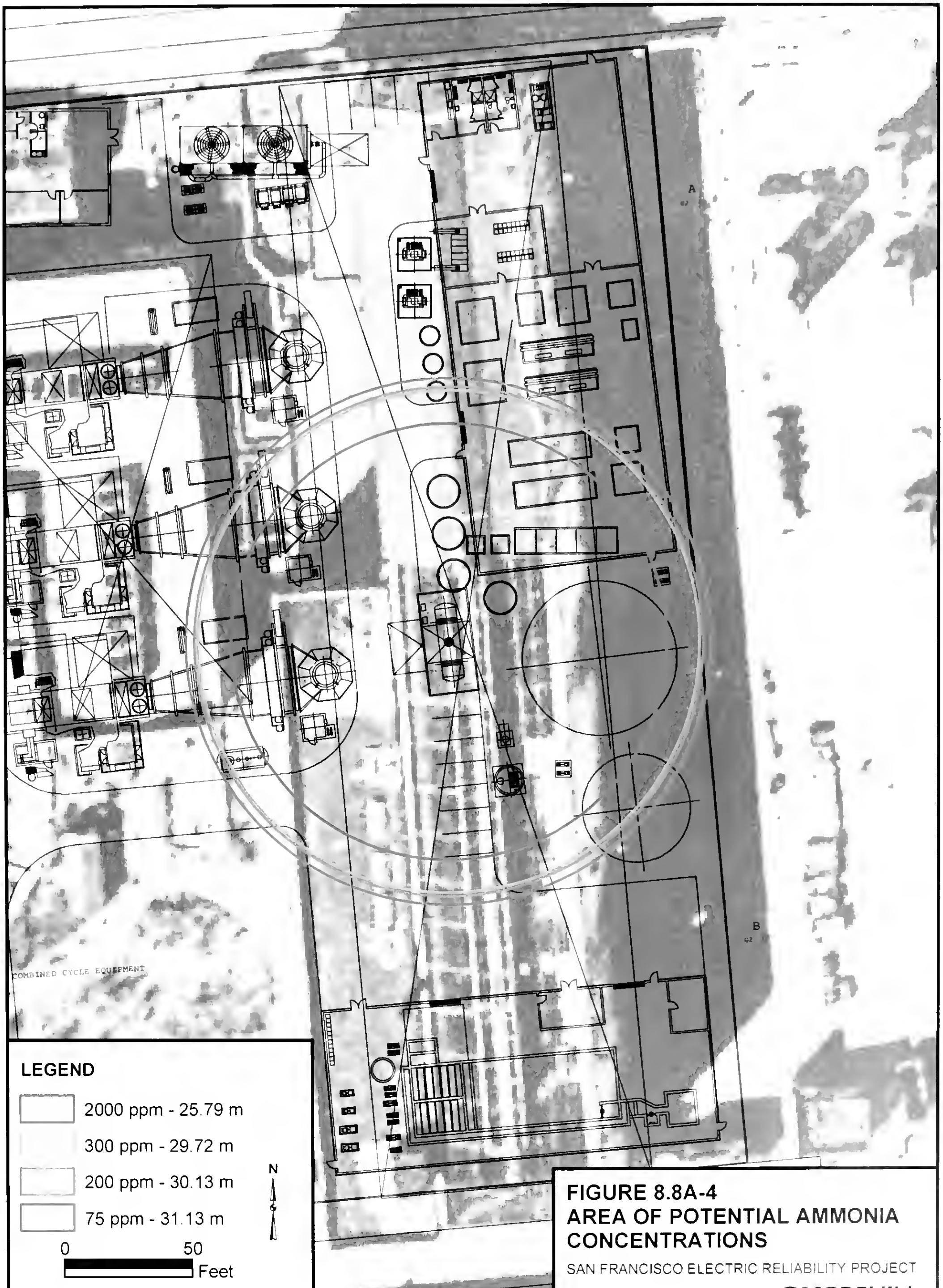


FIGURE 8.8A-4
AREA OF POTENTIAL AMMONIA CONCENTRATIONS

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

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ATTACHMENT 8.8A-1

2000 Census Ethnic Data by Block SFERP 6-Mile Radius

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060014017002021	17	0	17	100.0%
060014017002022	90	7	83	92.2%
060014017002023	75	3	72	96.0%
060014017002026	3	0	3	100.0%
060014017002027	23	0	23	100.0%
060014017002028	136	6	130	95.6%
060014017002029	78	0	78	100.0%
060014017003003	96	16	80	83.3%
060014018002001	147	3	144	98.0%
060014018002002	177	2	175	98.9%
060014018002003	118	0	118	100.0%
060014018002004	72	0	72	100.0%
060014018002005	73	0	73	100.0%
060014018002006	4	0	4	100.0%
060014018002007	60	1	59	98.3%
060014018002008	138	11	127	92.0%
060014018002009	101	1	100	99.0%
060014019001007	94	1	93	98.9%
060014019001008	91	6	85	93.4%
060014019001009	4	0	4	100.0%
060014019001010	101	7	94	93.1%
060014019001018	41	32	9	22.0%
060014019001024	126	0	126	100.0%
060014019001025	123	13	110	89.4%
060014019001026	124	32	92	74.2%
060014019001027	55	15	40	72.7%
060014022002006	60	30	30	50.0%
060014022002007	78	14	64	82.1%
060014274002000	757	449	308	40.7%
060014274002002	2	1	1	50.0%
060014274002003	59	40	19	32.2%
060014274002004	210	129	81	38.6%
060014274002005	65	48	17	26.2%
060014274002006	67	43	24	35.8%
060014274002007	19	9	10	52.6%
060014274002008	13	7	6	46.2%
060014274002009	12	5	7	58.3%
060014274002010	33	23	10	30.3%
060014274002011	12	10	2	16.7%
060014275001002	198	160	38	19.2%
060014275001008	64	28	36	56.3%
060014275001009	20	16	4	20.0%
060014275001010	13	11	2	15.4%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060014275001011	20	20	0	0.0%
060014275001012	38	29	9	23.7%
060014275001018	63	33	30	47.6%
060014275001019	7	4	3	42.9%
060014275001020	20	12	8	40.0%
060014275001022	52	2	50	96.2%
060014275001023	18	0	18	100.0%
060014275001024	30	22	8	26.7%
060014275001025	2	1	1	50.0%
060014276001001	116	32	84	72.4%
060014276001002	2120	177	1943	91.7%
060014276001003	1060	270	790	74.5%
060014276001004	478	58	420	87.9%
060014276001006	110	26	84	76.4%
060014276001007	76	32	44	57.9%
060014276002000	503	55	448	89.1%
060014276002001	69	19	50	72.5%
060014276002002	159	48	111	69.8%
060014276002003	154	57	97	63.0%
060014276002004	20	8	12	60.0%
060014277001001	50	27	23	46.0%
060014277001002	81	28	53	65.4%
060014277001003	157	50	107	68.2%
060014277001004	187	80	107	57.2%
060014277001005	155	62	93	60.0%
060014277002000	91	57	34	37.4%
060014277002001	76	35	41	53.9%
060014277002002	195	119	76	39.0%
060014277002003	176	120	56	31.8%
060014277002004	234	98	136	58.1%
060014277002005	257	115	142	55.3%
060014277002006	115	76	39	33.9%
060014277002007	27	20	7	25.9%
060014277002008	562	293	269	47.9%
060014277002009	230	97	133	57.8%
060014277003000	63	30	33	52.4%
060014277003001	113	36	77	68.1%
060014277003002	83	48	35	42.2%
060014277003003	57	36	21	36.8%
060014277003004	63	38	25	39.7%
060014277003005	42	28	14	33.3%
060014277003006	480	285	195	40.6%
060014277003007	50	46	4	8.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
60014277003008	303	217	86	28.4%
60014277003009	138	75	63	45.7%
60014277003010	94	69	25	26.6%
60014277004000	181	76	105	58.0%
60014277004001	116	39	77	66.4%
60014277004002	131	30	101	77.1%
60014277004003	42	8	34	81.0%
060014277004004	17	12	5	29.4%
060014277004005	89	47	42	47.2%
060014277004006	73	59	14	19.2%
060014277004007	213	101	112	52.6%
060014286002000	575	265	310	53.9%
060750101001000	27	21	6	22.2%
060750101001012	203	142	61	30.0%
060750101001014	409	294	115	28.1%
060750101001020	13	13	0	0.0%
060750101002001	2	1	1	50.0%
060750101002004	214	98	116	54.2%
060750101002005	166	117	49	29.5%
060750101002006	305	158	147	48.2%
060750101002007	55	24	31	56.4%
060750101002008	54	10	44	81.5%
060750101002009	300	18	282	94.0%
060750101002010	20	13	7	35.0%
060750101002011	36	29	7	19.4%
060750101002012	139	98	41	29.5%
060750101002013	132	86	46	34.8%
060750101002014	66	51	15	22.7%
060750101002015	48	31	17	35.4%
060750101002016	94	86	8	8.5%
060750101002017	208	89	119	57.2%
060750101002019	89	80	9	10.1%
060750101002020	50	41	9	18.0%
060750101002021	249	157	92	36.9%
060750102001004	72	52	20	27.8%
060750102001005	80	61	19	23.8%
060750102001006	152	117	35	23.0%
060750102001007	161	129	32	19.9%
060750102001008	107	90	17	15.9%
060750102001010	228	197	31	13.6%
060750102001011	101	89	12	11.9%
060750102001012	102	95	7	6.9%
060750102001013	116	98	18	15.5%
060750102001015	197	172	25	12.7%
060750102002000	181	162	19	10.5%
060750102002001	205	171	34	16.6%
060750102002002	235	217	18	7.7%
060750102002003	188	157	31	16.5%
060750102002004	218	178	40	18.3%
060750102002005	290	256	34	11.7%
060750102002006	180	160	20	11.1%
060750102002007	432	358	74	17.1%
060750102003001	265	187	78	29.4%
060750102003003	291	226	65	22.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750102003004	149	123	26	17.4%
060750102003006	215	183	32	14.9%
060750102003007	123	109	14	11.4%
060750103001000	132	49	83	62.9%
060750103001001	118	61	57	48.3%
060750103001002	213	125	88	41.3%
060750103001003	42	31	11	26.2%
060750103001004	47	31	16	34.0%
060750103001006	120	73	47	39.2%
060750103001007	47	40	7	14.9%
060750103001008	64	59	5	7.8%
060750103001009	82	77	5	6.1%
060750103001010	202	167	35	17.3%
060750103001011	295	116	179	60.7%
060750103001012	167	83	84	50.3%
060750103002000	236	67	169	71.6%
060750103002001	165	54	111	67.3%
060750103002002	155	34	121	78.1%
060750103002003	210	167	43	20.5%
060750103002004	205	92	113	55.1%
060750103002005	360	144	216	60.0%
060750103003000	322	170	152	47.2%
060750103003001	119	78	41	34.5%
060750103003002	187	142	45	24.1%
060750103003003	40	33	7	17.5%
060750103003004	57	49	8	14.0%
060750103003005	180	159	21	11.7%
060750103003006	103	79	24	23.3%
060750103003007	224	195	29	12.9%
060750104001000	318	108	210	66.0%
060750104001001	191	90	101	52.9%
060750104001004	118	33	85	72.0%
060750104001005	54	18	36	66.7%
060750104002000	251	199	52	20.7%
060750104002001	295	181	114	38.6%
060750104002002	327	165	162	49.5%
060750104002003	252	173	79	31.3%
060750104002004	36	32	4	11.1%
060750104002005	407	162	245	60.2%
060750104002006	223	108	115	51.6%
060750104003000	118	105	13	11.0%
060750104003001	274	200	74	27.0%
060750104003002	84	62	22	26.2%
060750104003003	139	127	12	8.6%
060750104003004	43	39	4	9.3%
060750104003005	113	91	22	19.5%
060750104003006	12	12	0	0.0%
060750104003008	216	168	48	22.2%
060750104003009	75	61	14	18.7%
060750104003010	71	68	3	4.2%
060750104003011	311	189	122	39.2%
060750104003012	63	58	5	7.9%
060750104004000	16	16	0	0.0%
060750104004001	81	74	7	8.6%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750104004002	123	100	23	18.7%
060750104004003	199	118	81	40.7%
060750104004004	284	192	92	32.4%
060750104004005	165	105	60	36.4%
060750105001002	285	219	66	23.2%
060750105001004	290	230	60	20.7%
060750105001023	3	1	2	66.7%
060750105001024	27	21	6	22.2%
060750105001025	14	12	2	14.3%
060750105002000	1	0	1	100.0%
060750105002001	71	48	23	32.4%
060750105002002	81	50	31	38.3%
060750105002004	117	85	32	27.4%
060750105002005	1321	1000	321	24.3%
060750105002009	7	4	3	42.9%
060750106001000	75	65	10	13.3%
060750106001001	105	49	56	53.3%
060750106001002	13	7	6	46.2%
060750106001003	11	2	9	81.8%
060750106001004	236	72	164	69.5%
060750106001005	238	82	156	65.5%
060750106001006	240	29	211	87.9%
060750106001007	145	48	97	66.9%
060750106001008	355	170	185	52.1%
060750106001009	43	27	16	37.2%
060750106002000	103	45	58	56.3%
060750106002001	122	41	81	66.4%
060750106002002	395	246	149	37.7%
060750106002003	96	21	75	78.1%
060750106002004	219	53	166	75.8%
060750106002005	73	0	73	100.0%
060750106002006	129	4	125	96.9%
060750106002007	184	15	169	91.8%
060750106003000	233	39	194	83.3%
060750106003001	172	55	117	68.0%
060750106003004	79	56	23	29.1%
060750106003005	172	47	125	72.7%
060750106003006	252	37	215	85.3%
060750106003007	102	28	74	72.5%
060750106003008	167	46	121	72.5%
060750106003009	92	22	70	76.1%
060750106003010	53	11	42	79.2%
060750106003011	175	60	115	65.7%
060750107001000	228	110	118	51.8%
060750107001002	244	106	138	56.6%
060750107001003	364	133	231	63.5%
060750107001004	63	24	39	61.9%
060750107001005	74	51	23	31.1%
060750107002000	655	41	614	93.7%
060750107002001	25	8	17	68.0%
060750107002002	354	25	329	92.9%
060750107002003	477	92	385	80.7%
060750107002004	526	57	469	89.2%
060750107002005	214	1	213	99.5%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750107002006	757	26	731	96.6%
060750107003000	208	0	208	100.0%
060750107003001	30	2	28	93.3%
060750107003002	45	24	21	46.7%
060750107003003	314	5	309	98.4%
060750107003004	52	0	52	100.0%
060750107003005	547	13	534	97.6%
060750107003006	264	2	262	99.2%
060750107003007	193	24	169	87.6%
060750108001000	188	140	48	25.5%
060750108001001	209	177	32	15.3%
060750108001002	150	96	54	36.0%
060750108001003	132	75	57	43.2%
060750108001004	94	65	29	30.9%
060750108001005	371	150	221	59.6%
060750108001006	168	68	100	59.5%
060750108002000	319	7	312	97.8%
060750108002001	104	13	91	87.5%
060750108002002	134	55	79	59.0%
060750108002003	215	115	100	46.5%
060750108002004	192	96	96	50.0%
060750108002005	198	54	144	72.7%
060750108002006	238	24	214	89.9%
060750108002007	366	121	245	66.9%
060750108003000	336	16	320	95.2%
060750108003001	257	75	182	70.8%
060750108003002	431	153	278	64.5%
060750108003003	334	242	92	27.5%
060750108003004	264	81	183	69.3%
060750108003005	430	195	235	54.7%
060750109001000	268	231	37	13.8%
060750109001001	281	210	71	25.3%
060750109001002	49	26	23	46.9%
060750109001003	64	38	26	40.6%
060750109001004	268	204	64	23.9%
060750109001005	90	48	42	46.7%
060750109001006	61	34	27	44.3%
060750109002000	347	262	85	24.5%
060750109002001	280	182	98	35.0%
060750109002002	309	223	86	27.8%
060750109002003	231	153	78	33.8%
060750109002004	272	162	110	40.4%
060750109002005	315	168	147	46.7%
060750109003000	268	223	45	16.8%
060750109003001	254	175	79	31.1%
060750109003002	321	264	57	17.8%
060750109003003	266	221	45	16.9%
060750109003004	273	155	118	43.2%
060750109003005	289	171	118	40.8%
060750110001000	163	80	83	50.9%
060750110001001	155	56	99	63.9%
060750110001002	86	35	51	59.3%
060750110001003	141	53	88	62.4%
060750110001004	152	83	69	45.4%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750110001005	171	139	32	18.7%
060750110002000	661	122	539	81.5%
060750110002001	367	87	280	76.3%
060750110002002	262	87	175	66.8%
060750110002003	81	56	25	30.9%
060750110002004	300	75	225	75.0%
060750110002005	424	201	223	52.6%
060750110003000	540	172	368	68.1%
060750110003001	445	250	195	43.8%
060750110003002	364	141	223	61.3%
060750110003003	448	132	316	70.5%
060750110003004	108	75	33	30.6%
060750110003005	161	76	85	52.8%
060750111001000	432	220	212	49.1%
060750111001001	584	217	367	62.8%
060750111001002	422	219	203	48.1%
060750111001003	336	92	244	72.6%
060750111001004	82	63	19	23.2%
060750111001005	385	212	173	44.9%
060750111002000	472	252	220	46.6%
060750111002001	562	259	303	53.9%
060750111002002	480	234	246	51.3%
060750111002003	489	231	258	52.8%
060750111002004	236	105	131	55.5%
060750111002005	41	26	15	36.6%
060750111003000	365	144	221	60.5%
060750111003001	355	219	136	38.3%
060750111003002	87	63	24	27.6%
060750111003003	72	21	51	70.8%
060750111003004	14	12	2	14.3%
060750111003005	145	90	55	37.9%
060750112001000	393	48	345	87.8%
060750112001001	295	26	269	91.2%
060750112001002	316	160	156	49.4%
060750112001003	453	335	118	26.0%
060750112001004	124	111	13	10.5%
060750112002000	168	111	57	33.9%
060750112002001	227	162	65	28.6%
060750112002002	176	129	47	26.7%
060750112002003	373	258	115	30.8%
060750112002004	176	133	43	24.4%
060750112002005	68	55	13	19.1%
060750112002006	102	70	32	31.4%
060750112003000	305	162	143	46.9%
060750112003004	2	1	1	50.0%
060750112003005	522	347	175	33.5%
060750113001000	267	0	267	100.0%
060750113001001	369	3	366	99.2%
060750113001002	237	26	211	89.0%
060750113001003	335	21	314	93.7%
060750113001004	425	58	367	86.4%
060750113001005	105	0	105	100.0%
060750113001006	43	7	36	83.7%
060750113002000	234	3	231	98.7%
060750113002001	186	27	159	85.5%
060750113002002	278	111	167	60.1%
060750113002003	231	1	230	99.6%
060750113002004	449	101	348	77.5%
060750113002005	105	66	39	37.1%
060750114001000	436	36	400	91.7%
060750114001001	25	3	22	88.0%
060750114001002	658	0	658	100.0%
060750114002000	314	2	312	99.4%
060750114002001	94	0	94	100.0%
060750114002002	171	0	171	100.0%
060750114002003	743	0	743	100.0%
060750114002004	299	7	292	97.7%
060750114002005	108	0	108	100.0%
060750114002006	155	0	155	100.0%
060750114002007	135	0	135	100.0%
060750114002008	37	0	37	100.0%
060750115001002	56	22	34	60.7%
060750115001004	96	1	95	99.0%
060750115001009	1	0	1	100.0%
060750115001014	35	26	9	25.7%
060750115001015	286	87	199	69.6%
060750115001016	262	14	248	94.7%
060750115001024	23	0	23	100.0%
060750117001013	1	1	0	0.0%
060750117001017	73	59	14	19.2%
060750117001018	1	0	1	100.0%
060750117001020	7	3	4	57.1%
060750117001025	237	6	231	97.5%
060750117001026	4	0	4	100.0%
060750117001028	41	0	41	100.0%
060750117001029	183	15	168	91.8%
060750117001030	213	137	76	35.7%
060750117001031	3	0	3	100.0%
060750117002003	125	76	49	39.2%
060750117002005	70	5	65	92.9%
060750117002007	56	29	27	48.2%
060750117002008	585	135	450	76.9%
060750117002009	5	1	4	80.0%
060750117002012	2	0	2	100.0%
060750117002022	57	29	28	49.1%
060750117002023	3	1	2	66.7%
060750117002026	79	29	50	63.3%
060750117002028	2	1	1	50.0%
060750118001000	282	0	282	100.0%
060750118001001	79	4	75	94.9%
060750118001002	219	0	219	100.0%
060750118001003	185	2	183	98.9%
060750118001004	402	110	292	72.6%
060750118001005	81	12	69	85.2%
060750118001006	280	2	278	99.3%
060750119001000	304	221	83	27.3%
060750119001001	90	67	23	25.6%
060750119001003	253	189	64	25.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750119001004	368	268	100	27.2%
060750119001005	605	321	284	46.9%
060750119002000	460	224	236	51.3%
060750119002001	499	155	344	68.9%
060750119002002	507	359	148	29.2%
060750119002003	680	449	231	34.0%
060750119003000	633	381	252	39.8%
060750119003001	844	540	304	36.0%
060750120001000	717	431	286	39.9%
060750120001001	719	418	301	41.9%
060750120001002	67	16	51	76.1%
060750120001003	109	51	58	53.2%
060750120001004	11	8	3	27.3%
060750120001005	342	163	179	52.3%
060750120002000	663	352	311	46.9%
060750120002001	778	400	378	48.6%
060750120002004	31	15	16	51.6%
060750120002005	535	190	345	64.5%
060750121001000	482	290	192	39.8%
060750121001001	654	396	258	39.4%
060750121001002	647	393	254	39.3%
060750121001003	463	212	251	54.2%
060750121001004	52	26	26	50.0%
060750121001005	95	56	39	41.1%
060750121001006	148	66	82	55.4%
060750121002000	348	192	156	44.8%
060750121002001	460	277	183	39.8%
060750121002002	2	2	0	0.0%
060750121002003	111	34	77	69.4%
060750122001000	830	405	425	51.2%
060750122001001	329	170	159	48.3%
060750122001002	600	204	396	66.0%
060750122001003	882	370	512	58.0%
060750122002000	1128	430	698	61.9%
060750122002001	954	194	760	79.7%
060750122003000	282	68	214	75.9%
060750122003001	113	36	77	68.1%
060750122003002	290	105	185	63.8%
060750122003003	324	157	167	51.5%
060750122003004	368	145	223	60.6%
060750122003005	71	16	55	77.5%
060750122003006	58	32	26	44.8%
060750122003007	446	206	240	53.8%
060750122003008	214	112	102	47.7%
060750122003009	90	56	34	37.8%
060750122003010	32	26	6	18.8%
060750122003011	24	7	17	70.8%
060750123001000	3	0	3	100.0%
060750123001001	207	101	106	51.2%
060750123001002	531	213	318	59.9%
060750123001003	236	151	85	36.0%
060750123001004	806	407	399	49.5%
060750123001005	782	385	397	50.8%
060750123001006	406	104	302	74.4%
060750123001007	99	51	48	48.5%
060750123002000	51	35	16	31.4%
060750123002001	1	0	1	100.0%
060750123002002	36	23	13	36.1%
060750123002003	322	109	213	66.1%
060750123002004	42	31	11	26.2%
060750123002005	1216	431	785	64.6%
060750123002006	1467	441	1026	69.9%
060750124001000	449	99	350	78.0%
060750124001001	985	340	645	65.5%
060750124001002	433	208	225	52.0%
060750124002000	843	171	672	79.7%
060750124002001	1393	344	1049	75.3%
060750124002002	549	174	375	68.3%
060750124003000	831	419	412	49.6%
060750124003001	241	99	142	58.9%
060750124003004	148	83	65	43.9%
060750124004000	3	0	3	100.0%
060750124004005	60	39	21	35.0%
060750124004010	55	10	45	81.8%
060750124004011	46	35	11	23.9%
060750124004012	505	340	165	32.7%
060750124004013	80	47	33	41.3%
060750124005000	200	24	176	88.0%
060750124005001	206	113	93	45.1%
060750124005002	68	30	38	55.9%
060750124005003	344	87	257	74.7%
060750124005004	257	130	127	49.4%
060750124005005	492	349	143	29.1%
060750125001000	690	254	436	63.2%
060750125001001	1299	238	1061	81.7%
060750125001002	1123	223	900	80.1%
060750125001003	818	258	560	68.5%
060750125002000	11	10	1	9.1%
060750125002001	61	14	47	77.0%
060750125002002	288	87	201	69.8%
060750125002003	675	294	381	56.4%
060750125002004	74	43	31	41.9%
060750125002005	1	0	1	100.0%
060750125003000	2	0	2	100.0%
060750125003001	1	1	0	0.0%
060750125003002	601	136	465	77.4%
060750125003003	1127	303	824	73.1%
060750125003004	894	355	539	60.3%
060750125003005	45	13	32	71.1%
060750125003006	17	3	14	82.4%
060750126001002	80	75	5	6.3%
060750126001010	128	109	19	14.8%
060750126001011	205	184	21	10.2%
060750126001012	230	191	39	17.0%
060750126001013	211	182	29	13.7%
060750126001014	241	166	75	31.1%
060750126002000	295	252	43	14.6%
060750126002001	199	178	21	10.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750126002002	177	142	35	19.8%
060750126002003	116	98	18	15.5%
060750126002004	116	103	13	11.2%
060750126002005	118	99	19	16.1%
060750126002006	161	147	14	8.7%
060750126002007	205	181	24	11.7%
060750126002008	269	235	34	12.6%
060750126002009	402	338	64	15.9%
060750126002010	121	95	26	21.5%
060750126002011	53	42	11	20.8%
060750126002012	79	70	9	11.4%
060750126003001	107	89	18	16.8%
060750126003002	87	63	24	27.6%
060750126003003	77	59	18	23.4%
060750126003004	218	193	25	11.5%
060750126003005	257	221	36	14.0%
060750126003006	107	95	12	11.2%
060750126003007	64	53	11	17.2%
060750126003008	116	98	18	15.5%
060750126003010	229	197	32	14.0%
060750126003011	141	129	12	8.5%
060750126003012	106	90	16	15.1%
060750127001006	47	45	2	4.3%
060750127001007	107	87	20	18.7%
060750127001008	159	128	31	19.5%
060750127001009	201	159	42	20.9%
060750127001010	147	124	23	15.6%
060750127001011	277	231	46	16.6%
060750127001012	124	98	26	21.0%
060750127001013	2	1	1	50.0%
060750127001014	158	142	16	10.1%
060750127001015	236	206	30	12.7%
060750127001016	70	57	13	18.6%
060750127002000	200	176	24	12.0%
060750127002001	240	204	36	15.0%
060750127002002	136	120	16	11.8%
060750127002003	198	172	26	13.1%
060750127002004	234	197	37	15.8%
060750127002005	219	181	38	17.4%
060750127003000	238	200	38	16.0%
060750127003001	225	195	30	13.3%
060750127003002	161	134	27	16.8%
060750127003003	2	2	0	0.0%
060750127003004	69	52	17	24.6%
060750127003006	47	42	5	10.6%
060750128001000	49	36	13	26.5%
060750128001001	81	64	17	21.0%
060750128001002	77	41	36	46.8%
060750128001003	105	90	15	14.3%
060750128001004	111	83	28	25.2%
060750128001005	13	8	5	38.5%
060750128001006	74	61	13	17.6%
060750128001007	70	54	16	22.9%
060750128001008	176	163	13	7.4%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750128001009	109	82	27	24.8%
060750128001010	251	199	52	20.7%
060750128001011	118	103	15	12.7%
060750128001012	127	101	26	20.5%
060750128001013	200	180	20	10.0%
060750128001014	79	74	5	6.3%
060750128002000	97	88	9	9.3%
060750128002001	120	115	5	4.2%
060750128002002	132	120	12	9.1%
060750128002003	104	93	11	10.6%
060750128002004	117	112	5	4.3%
060750128002005	116	110	6	5.2%
060750128002006	91	82	9	9.9%
060750128002007	90	83	7	7.8%
060750128003000	102	90	12	11.8%
060750128003001	160	150	10	6.3%
060750128003002	138	104	34	24.6%
060750128003003	157	131	26	16.6%
060750128003004	149	106	43	28.9%
060750128003005	163	124	39	23.9%
060750128003006	133	118	15	11.3%
060750128004000	122	88	34	27.9%
060750128004001	141	131	10	7.1%
060750128004002	159	124	35	22.0%
060750128004003	76	67	9	11.8%
060750128004004	38	32	6	15.8%
060750128004005	164	146	18	11.0%
060750129001000	217	177	40	18.4%
060750129001001	219	181	38	17.4%
060750129001002	263	231	32	12.2%
060750129001003	184	154	30	16.3%
060750129001004	171	136	35	20.5%
060750129001005	254	205	49	19.3%
060750129002000	244	185	59	24.2%
060750129002001	215	178	37	17.2%
060750129002002	237	205	32	13.5%
060750129002003	231	151	80	34.6%
060750129002004	116	83	33	28.4%
060750129002005	210	168	42	20.0%
060750129003000	264	215	49	18.6%
060750129003001	259	214	45	17.4%
060750129003002	257	207	50	19.5%
060750129003003	161	128	33	20.5%
060750129003004	174	136	38	21.8%
060750129003005	160	137	23	14.4%
060750129004000	187	165	22	11.8%
060750129004001	228	177	51	22.4%
060750129004002	267	213	54	20.2%
060750129004003	125	102	23	18.4%
060750129004004	77	63	14	18.2%
060750129004005	121	117	4	3.3%
060750129005000	6	5	1	16.7%
060750129005001	218	163	55	25.2%
060750129005002	91	80	11	12.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750129005003	73	53	20	27.4%
060750129005004	34	16	18	52.9%
060750129005005	2	2	0	0.0%
060750129005006	10	10	0	0.0%
060750129005007	111	97	14	12.6%
060750129005008	48	44	4	8.3%
060750129005009	71	52	19	26.8%
060750129005010	103	87	16	15.5%
060750129005011	98	81	17	17.3%
060750130001000	175	125	50	28.6%
060750130001001	209	168	41	19.6%
060750130001002	94	73	21	22.3%
060750130001003	160	129	31	19.4%
060750130001004	295	235	60	20.3%
060750130001005	215	173	42	19.5%
060750130002000	185	153	32	17.3%
060750130002001	166	141	25	15.1%
060750130002002	155	121	34	21.9%
060750130002003	88	71	17	19.3%
060750130002004	159	138	21	13.2%
060750130002005	223	206	17	7.6%
060750130003000	131	114	17	13.0%
060750130003001	148	134	14	9.5%
060750130003002	159	142	17	10.7%
060750130003003	166	148	18	10.8%
060750130003004	261	218	43	16.5%
060750130003005	166	151	15	9.0%
060750130004000	89	82	7	7.9%
060750130004001	152	102	50	32.9%
060750130004002	203	171	32	15.8%
060750130004003	178	149	29	16.3%
060750130004004	156	134	22	14.1%
060750130004005	197	172	25	12.7%
060750131001000	346	258	88	25.4%
060750131001001	346	287	59	17.1%
060750131001002	358	308	50	14.0%
060750131001003	135	110	25	18.5%
060750131001004	182	156	26	14.3%
060750131001005	336	288	48	14.3%
060750131002000	250	183	67	26.8%
060750131002001	301	243	58	19.3%
060750131002002	256	191	65	25.4%
060750131002003	282	212	70	24.8%
060750131002004	386	317	69	17.9%
060750131002005	438	380	58	13.2%
060750131003000	181	137	44	24.3%
060750131003001	197	163	34	17.3%
060750131003002	484	339	145	30.0%
060750131003003	43	34	9	20.9%
060750131003004	316	275	41	13.0%
060750131003005	205	183	22	10.7%
060750131003006	96	86	10	10.4%
060750131004000	306	251	55	18.0%
060750131004001	245	188	57	23.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750131004002	327	289	38	11.6%
060750131004003	197	162	35	17.8%
060750131004004	166	136	30	18.1%
060750131004005	88	72	16	18.2%
060750132001000	393	302	91	23.2%
060750132001001	92	79	13	14.1%
060750132001002	76	65	11	14.5%
060750132001003	363	305	58	16.0%
060750132001004	262	228	34	13.0%
060750132001005	248	214	34	13.7%
060750132001006	293	256	37	12.6%
060750132001007	281	238	43	15.3%
060750132001008	163	140	23	14.1%
060750132002000	78	73	5	6.4%
060750132002001	108	96	12	11.1%
060750132002002	158	136	22	13.9%
060750132002003	50	38	12	24.0%
060750132002004	179	139	40	22.3%
060750132002005	129	108	21	16.3%
060750132002006	59	49	10	16.9%
060750132003000	79	70	9	11.4%
060750132003001	56	54	2	3.6%
060750132003002	71	62	9	12.7%
060750132003003	102	93	9	8.8%
060750132003004	60	60	0	0.0%
060750132003005	32	28	4	12.5%
060750132003006	47	41	6	12.8%
060750132003007	72	67	5	6.9%
060750132003008	27	16	11	40.7%
060750132003009	41	35	6	14.6%
060750132003010	75	65	10	13.3%
060750132003011	83	78	5	6.0%
060750132003012	30	28	2	6.7%
060750132003013	39	31	8	20.5%
060750132003014	31	30	1	3.2%
060750132003015	49	43	6	12.2%
060750132003016	169	141	28	16.6%
060750132003017	183	149	34	18.6%
060750132003018	115	97	18	15.7%
060750132003019	68	49	19	27.9%
060750132003020	75	69	6	8.0%
060750133001000	71	56	15	21.1%
060750133001001	101	89	12	11.9%
060750133001002	81	71	10	12.3%
060750133001003	67	65	2	3.0%
060750133001004	119	111	8	6.7%
060750133001005	71	70	1	1.4%
060750133001006	103	96	7	6.8%
060750133001007	149	141	8	5.4%
060750133002000	160	138	22	13.8%
060750133002001	117	114	3	2.6%
060750133002002	128	116	12	9.4%
060750133002003	93	85	8	8.6%
060750133002004	126	102	24	19.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
0750133002005	167	155	12	7.2%
0750133002006	179	150	29	16.2%
0750133002007	136	109	27	19.9%
0750133003000	85	58	27	31.8%
0750133003001	214	192	22	10.3%
0750133003002	175	145	30	17.1%
0750133003003	105	77	28	26.7%
0750133003004	104	72	32	30.8%
0750133003005	89	59	30	33.7%
0750133004000	50	48	2	4.0%
0750133004001	22	15	7	31.8%
0750133004002	22	21	1	4.5%
0750133004003	37	30	7	18.9%
0750133004004	115	104	11	9.6%
0750133004005	46	44	2	4.3%
0750133004006	52	52	0	0.0%
0750133004007	66	56	10	15.2%
0750133004008	70	64	6	8.6%
0750133004009	57	50	7	12.3%
0750133004010	154	112	42	27.3%
0750133004011	107	92	15	14.0%
0750133005000	84	69	15	17.9%
0750133005001	147	134	13	8.8%
60750133005002	145	117	28	19.3%
60750133005003	179	150	29	16.2%
60750133005005	152	124	28	18.4%
60750134001000	2	1	1	50.0%
60750134001001	218	178	40	18.3%
60750134001002	122	100	22	18.0%
60750134001003	121	87	34	28.1%
60750134001004	262	208	54	20.6%
60750134001005	61	51	10	16.4%
60750134002000	174	148	26	14.9%
60750134002001	155	135	20	12.9%
60750134002002	161	134	27	16.8%
60750134002003	115	99	16	13.9%
60750134002004	158	112	46	29.1%
60750134002005	226	172	54	23.9%
60750134002006	239	183	56	23.4%
60750134002007	232	165	67	28.9%
60750134003000	180	153	27	15.0%
60750134003001	175	156	19	10.9%
60750134003002	196	174	22	11.2%
60750134003003	171	145	26	15.2%
60750134003004	154	131	23	14.9%
60750134003005	160	143	17	10.6%
60750134003006	235	199	36	15.3%
60750134003007	148	132	16	10.8%
060750135001000	167	145	22	13.2%
060750135001001	252	202	50	19.8%
060750135001002	182	155	27	14.8%
060750135001003	252	207	45	17.9%
060750135001004	213	174	39	18.3%
060750135001005	119	93	26	21.8%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750135001006	100	88	12	12.0%
060750135002000	283	208	75	26.5%
060750135002001	94	87	7	7.4%
060750135002002	14	10	4	28.6%
060750135002003	165	124	41	24.8%
060750135002004	186	148	38	20.4%
060750135002005	234	134	100	42.7%
060750135002006	108	93	15	13.9%
060750135002007	297	252	45	15.2%
060750151001001	405	303	102	25.2%
060750151001002	253	176	77	30.4%
060750151001003	368	335	33	9.0%
060750151001004	80	44	36	45.0%
060750151001005	48	14	34	70.8%
060750151001006	156	112	44	28.2%
060750151001008	59	29	30	50.8%
060750151001009	257	174	83	32.3%
060750151002001	279	171	108	38.7%
060750151002002	316	152	164	51.9%
060750151002004	2	0	2	100.0%
060750151002005	151	71	80	53.0%
060750151002007	39	28	11	28.2%
060750151002008	7	6	1	14.3%
060750152001000	285	193	92	32.3%
060750152001001	326	256	70	21.5%
060750152001002	152	101	51	33.6%
060750152001003	123	89	34	27.6%
060750152001004	231	102	129	55.8%
060750152001005	376	270	106	28.2%
060750152001006	253	139	114	45.1%
060750152002000	203	169	34	16.7%
060750152002001	228	188	40	17.5%
060750152002002	93	73	20	21.5%
060750152002003	117	64	53	45.3%
060750152002004	236	145	91	38.6%
060750152002005	197	145	52	26.4%
060750152002006	194	76	118	60.8%
060750152002007	136	52	84	61.8%
060750152003000	83	62	21	25.3%
060750152003001	38	13	25	65.8%
060750152003002	92	63	29	31.5%
060750152003003	62	37	25	40.3%
060750152003004	115	75	40	34.8%
060750152003005	81	50	31	38.3%
060750152003006	96	73	23	24.0%
060750152003007	140	91	49	35.0%
060750153001000	85	68	17	20.0%
060750153001001	170	131	39	22.9%
060750153001002	72	35	37	51.4%
060750153001003	163	106	57	35.0%
060750153001004	120	85	35	29.2%
060750153001005	38	19	19	50.0%
060750153001006	219	111	108	49.3%
060750153002000	34	27	7	20.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750153002001	9	6	3	33.3%
060750153002002	166	100	66	39.8%
060750153002003	280	158	122	43.6%
060750153002004	195	124	71	36.4%
060750153002005	185	143	42	22.7%
060750153002006	171	126	45	26.3%
060750153002007	207	137	70	33.8%
060750154001000	188	129	59	31.4%
060750154001001	205	156	49	23.9%
060750154001004	182	141	41	22.5%
060750154001005	157	101	56	35.7%
060750154002000	172	115	57	33.1%
060750154002001	225	120	105	46.7%
060750154002002	194	87	107	55.2%
060750154002003	158	117	41	25.9%
060750154002004	247	122	125	50.6%
060750154002005	247	143	104	42.1%
060750154003001	325	213	112	34.5%
060750154003002	278	149	129	46.4%
060750154003003	587	282	305	52.0%
060750154003004	291	184	107	36.8%
060750154004002	222	165	57	25.7%
060750154004003	138	104	34	24.6%
060750154004004	156	117	39	25.0%
060750154004005	124	81	43	34.7%
060750154004006	90	75	15	16.7%
060750154004007	87	55	32	36.8%
060750154005000	155	131	24	15.5%
060750154005001	124	110	14	11.3%
060750154005002	163	124	39	23.9%
060750154005003	319	224	95	29.8%
060750154005004	190	107	83	43.7%
060750154005005	204	156	48	23.5%
060750154005006	158	102	56	35.4%
060750154005007	176	121	55	31.3%
060750155001000	417	258	159	38.1%
060750155001001	214	27	187	87.4%
060750155001002	49	27	22	44.9%
060750155001003	93	18	75	80.6%
060750155001004	8	4	4	50.0%
060750155001005	608	516	92	15.1%
060750155001006	118	10	108	91.5%
060750155002000	215	15	200	93.0%
060750155002001	375	108	267	71.2%
060750155002002	336	220	116	34.5%
060750155002003	313	169	144	46.0%
060750155002005	38	0	38	100.0%
060750155003000	15	6	9	60.0%
060750155003001	111	65	46	41.4%
060750155003002	346	17	329	95.1%
060750155003003	272	106	166	61.0%
060750155003004	30	22	8	26.7%
060750155003006	33	6	27	81.8%
060750156001000	147	67	80	54.4%
060750156001001	132	60	72	54.5%
060750156001002	114	87	27	23.7%
060750156001003	99	59	40	40.4%
060750156001004	104	39	65	62.5%
060750156001005	95	48	47	49.5%
060750156002000	131	79	52	39.7%
060750156002001	259	146	113	43.6%
060750156002002	230	119	111	48.3%
060750156002003	248	129	119	48.0%
060750156002004	263	166	97	36.9%
060750156002005	92	61	31	33.7%
060750156003000	157	108	49	31.2%
060750156003001	69	43	26	37.7%
060750156003002	44	30	14	31.8%
060750156003003	117	59	58	49.6%
060750156003004	144	69	75	52.1%
060750156003005	376	175	201	53.5%
060750157001000	229	135	94	41.0%
060750157001003	76	46	30	39.5%
060750157001004	105	55	50	47.6%
060750157001005	130	65	65	50.0%
060750157001006	86	43	43	50.0%
060750157001007	73	46	27	37.0%
060750157001008	56	11	45	80.4%
060750157001009	154	86	68	44.2%
060750157001010	9	3	6	66.7%
060750157001011	89	45	44	49.4%
060750157001012	117	81	36	30.8%
060750157002000	184	97	87	47.3%
060750157002001	191	104	87	45.5%
060750157002002	219	149	70	32.0%
060750157002003	279	170	109	39.1%
060750157002004	267	196	71	26.6%
060750157002005	301	232	69	22.9%
060750157002006	31	23	8	25.8%
060750157002007	200	125	75	37.5%
060750157003000	162	83	79	48.8%
060750157003001	177	70	107	60.5%
060750157003002	200	110	90	45.0%
060750157003003	186	103	83	44.6%
060750157003004	192	72	120	62.5%
060750157003005	148	63	85	57.4%
060750157003007	153	87	66	43.1%
060750157003008	55	32	23	41.8%
060750157003009	86	41	45	52.3%
060750157003010	21	20	1	4.8%
060750157003011	57	39	18	31.6%
060750157003012	87	52	35	40.2%
060750157003013	100	65	35	35.0%
060750157004000	127	62	65	51.2%
060750157004001	58	48	10	17.2%
060750157004002	53	39	14	26.4%
060750157004003	59	38	21	35.6%
060750157004004	1938	950	988	51.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
60750157004005	83	62	21	25.3%
60750157004006	137	75	62	45.3%
60750158001000	8	7	1	12.5%
60750158001001	217	74	143	65.9%
60750158001003	44	12	32	72.7%
60750158001004	282	3	279	98.9%
60750158002000	306	7	299	97.7%
60750158002001	425	2	423	99.5%
60750158002002	132	75	57	43.2%
60750158002003	232	87	145	62.5%
60750158002004	310	208	102	32.9%
60750158002005	220	139	81	36.8%
60750158003000	203	146	57	28.1%
60750158003001	209	148	61	29.2%
60750158003002	304	154	150	49.3%
60750158003003	266	166	100	37.6%
60750158003004	256	166	90	35.2%
060750158003005	388	192	196	50.5%
060750158004000	178	118	60	33.7%
060750158004001	145	64	81	55.9%
060750158004002	279	169	110	39.4%
060750158004003	210	128	82	39.0%
060750158004004	214	115	99	46.3%
060750158004005	272	167	105	38.6%
060750158005000	292	17	275	94.2%
060750158005001	10	5	5	50.0%
060750158005003	82	56	26	31.7%
060750158005004	131	84	47	35.9%
060750158005005	115	31	84	73.0%
060750158005006	110	62	48	43.6%
060750158005007	108	36	72	66.7%
060750158005008	187	99	88	47.1%
060750158005009	51	31	20	39.2%
060750158005010	63	41	22	34.9%
060750158005011	292	184	108	37.0%
060750158005012	330	4	326	98.8%
060750159001000	136	78	58	42.6%
060750159001001	322	140	182	56.5%
060750159001002	468	124	344	73.5%
060750159001003	41	9	32	78.0%
060750159001004	104	26	78	75.0%
060750159001006	17	6	11	64.7%
060750159001007	11	4	7	63.6%
060750159001008	34	6	28	82.4%
060750159001010	76	13	63	82.9%
060750159001011	41	9	32	78.0%
060750159001013	18	5	13	72.2%
060750159001015	113	30	83	73.5%
060750159001016	673	399	274	40.7%
060750159002000	321	116	205	63.9%
060750159002001	205	108	97	47.3%
060750159002002	1227	538	689	56.2%
060750159002005	358	88	270	75.4%
060750160001000	107	49	58	54.2%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750160001001	321	228	93	29.0%
060750160001002	157	110	47	29.9%
060750160001004	68	55	13	19.1%
060750160001005	70	28	42	60.0%
060750160001006	43	28	15	34.9%
060750160001007	84	52	32	38.1%
060750160001008	127	57	70	55.1%
060750160001009	136	67	69	50.7%
060750160001010	172	68	104	60.5%
060750160001011	424	268	156	36.8%
060750160001012	145	81	64	44.1%
060750160001014	65	54	11	16.9%
060750160001015	107	75	32	29.9%
060750161001001	28	16	12	42.9%
060750161001002	209	11	198	94.7%
060750161001003	174	3	171	98.3%
060750161001004	83	6	77	92.8%
060750161001005	225	18	207	92.0%
060750161001006	227	6	221	97.4%
060750161002000	186	4	182	97.8%
060750161002001	177	1	176	99.4%
060750161002002	83	0	83	100.0%
060750161002003	261	33	228	87.4%
060750161002004	358	244	114	31.8%
060750161002005	626	323	303	48.4%
060750161003000	262	21	241	92.0%
060750161003001	289	129	160	55.4%
060750161003002	31	10	21	67.7%
060750161003003	343	60	283	82.5%
060750161003005	359	18	341	95.0%
060750161004001	133	16	117	88.0%
060750161004002	452	133	319	70.6%
060750161004003	79	1	78	98.7%
060750161004004	544	217	327	60.1%
060750161004005	128	43	85	66.4%
060750162001001	34	18	16	47.1%
060750162001003	124	81	43	34.7%
060750162001004	180	97	83	46.1%
060750162001005	51	12	39	76.5%
060750162001006	70	49	21	30.0%
060750162001008	144	112	32	22.2%
060750162001009	73	44	29	39.7%
060750162002001	63	42	21	33.3%
060750162002002	37	23	14	37.8%
060750162002003	51	36	15	29.4%
060750162002004	54	45	9	16.7%
060750162002005	124	95	29	23.4%
060750162002006	119	76	43	36.1%
060750162002009	186	101	85	45.7%
060750162002010	262	65	197	75.2%
060750162003000	1	0	1	100.0%
060750162003001	278	121	157	56.5%
060750162003002	121	75	46	38.0%
060750162003003	164	112	52	31.7%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750162003004	106	67	39	36.8%
060750162003005	183	135	48	26.2%
060750162003006	77	38	39	50.6%
060750163001000	142	3	139	97.9%
060750163001001	82	12	70	85.4%
060750163001002	242	22	220	90.9%
060750163001003	96	47	49	51.0%
060750163001004	93	15	78	83.9%
060750163001005	88	1	87	98.9%
060750163001006	168	99	69	41.1%
060750163001007	128	73	55	43.0%
060750163002000	67	53	14	20.9%
060750163002001	140	3	137	97.9%
060750163002002	243	66	177	72.8%
060750163002003	155	104	51	32.9%
060750163002004	133	62	71	53.4%
060750163002005	140	84	56	40.0%
060750163002006	134	93	41	30.6%
060750163002007	188	108	80	42.6%
060750163003000	257	122	135	52.5%
060750163003001	198	133	65	32.8%
060750163003002	340	233	107	31.5%
060750163003003	339	147	192	56.6%
060750163003004	296	227	69	23.3%
060750163003005	272	186	86	31.6%
060750163003006	342	203	139	40.6%
060750163003007	238	143	95	39.9%
060750164001001	284	204	80	28.2%
060750164001002	310	207	103	33.2%
060750164001003	250	177	73	29.2%
060750164001004	399	240	159	39.8%
060750164001005	104	78	26	25.0%
060750164001006	297	177	120	40.4%
060750164001007	376	250	126	33.5%
060750164001008	137	74	63	46.0%
060750164002000	148	89	59	39.9%
060750164002001	274	176	98	35.8%
060750164002002	379	159	220	58.0%
060750164002003	252	173	79	31.3%
060750164002004	282	175	107	37.9%
060750164002005	261	136	125	47.9%
060750164002006	21	11	10	47.6%
060750164002007	17	15	2	11.8%
060750165001000	224	148	76	33.9%
060750165001001	303	214	89	29.4%
060750165001002	257	146	111	43.2%
060750165001003	218	128	90	41.3%
060750165001004	321	177	144	44.9%
060750165001005	213	131	82	38.5%
060750165002000	266	146	120	45.1%
060750165002001	215	107	108	50.2%
060750165002003	175	123	52	29.7%
060750165002004	205	134	71	34.6%
060750165002005	254	143	111	43.7%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750165003000	215	154	61	28.4%
060750165003001	232	151	81	34.9%
060750165003002	148	109	39	26.4%
060750165003003	235	129	106	45.1%
060750165003004	265	204	61	23.0%
060750165003005	261	193	68	26.1%
060750165004000	114	68	46	40.4%
060750165004001	346	227	119	34.4%
060750165004002	182	123	59	32.4%
060750165004003	260	197	63	24.2%
060750165004004	212	160	52	24.5%
060750166001000	221	155	66	29.9%
060750166001001	261	199	62	23.8%
060750166001002	271	215	56	20.7%
060750166001003	269	209	60	22.3%
060750166001004	249	182	67	26.9%
060750166001005	204	152	52	25.5%
060750166002000	87	55	32	36.8%
060750166002001	136	105	31	22.8%
060750166002002	235	177	58	24.7%
060750166002003	267	207	60	22.5%
060750166002004	178	134	44	24.7%
060750166002005	206	173	33	16.0%
060750166003000	344	244	100	29.1%
060750166003001	142	120	22	15.5%
060750166003002	171	130	41	24.0%
060750166003003	198	140	58	29.3%
060750166003004	179	128	51	28.5%
060750166003005	80	61	19	23.8%
060750166004000	151	108	43	28.5%
060750166004001	232	192	40	17.2%
060750166004002	298	235	63	21.1%
060750166004003	226	167	59	26.1%
060750166004004	239	190	49	20.5%
060750166004005	201	157	44	21.9%
060750167001000	390	272	118	30.3%
060750167001001	210	147	63	30.0%
060750167001002	248	161	87	35.1%
060750167001003	270	158	112	41.5%
060750167001004	315	209	106	33.7%
060750167001005	311	208	103	33.1%
060750167002000	431	317	114	26.5%
060750167002001	139	110	29	20.9%
060750167002002	50	46	4	8.0%
060750167002003	52	40	12	23.1%
060750167003000	201	149	52	25.9%
060750167003001	241	173	68	28.2%
060750167003002	197	147	50	25.4%
060750167003003	14	3	11	78.6%
060750167003004	93	82	11	11.8%
060750167003005	137	112	25	18.2%
060750167004000	191	114	77	40.3%
060750167004001	195	141	54	27.7%
060750167004002	249	166	83	33.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750167004003	208	153	55	26.4%
060750167004004	310	213	97	31.3%
060750167004005	249	174	75	30.1%
060750168001000	14	7	7	50.0%
060750168001001	56	40	16	28.6%
060750168001002	90	51	39	43.3%
060750168001003	36	24	12	33.3%
060750168001004	139	95	44	31.7%
060750168001005	2	2	0	0.0%
060750168001006	167	99	68	40.7%
060750168001007	65	36	29	44.6%
060750168001008	87	61	26	29.9%
060750168001009	51	24	27	52.9%
060750168001010	17	11	6	35.3%
060750168001012	58	41	17	29.3%
060750168001014	3	1	2	66.7%
060750168001015	31	17	14	45.2%
060750168002000	141	99	42	29.8%
060750168002001	109	55	54	49.5%
060750168002002	177	123	54	30.5%
060750168002003	262	182	80	30.5%
060750168002004	232	161	71	30.6%
060750168003001	147	84	63	42.9%
060750168003002	114	85	29	25.4%
060750168003003	222	170	52	23.4%
060750168003005	252	213	39	15.5%
060750168004000	154	83	71	46.1%
060750168004001	191	112	79	41.4%
060750168004002	312	220	92	29.5%
060750168004003	136	3	133	97.8%
060750168004004	208	131	77	37.0%
060750168004005	131	106	25	19.1%
060750168004006	249	22	227	91.2%
060750168005000	269	204	65	24.2%
060750168005001	270	178	92	34.1%
060750168005002	213	126	87	40.8%
060750168005003	112	81	31	27.7%
060750168005004	279	159	120	43.0%
060750168005005	136	76	60	44.1%
060750168006000	135	94	41	30.4%
060750168006001	125	74	51	40.8%
060750168006002	124	98	26	21.0%
060750168006003	129	91	38	29.5%
060750168006004	9	2	7	77.8%
060750168006005	225	150	75	33.3%
060750168006006	222	142	80	36.0%
060750169001001	178	140	38	21.3%
060750169001003	277	207	70	25.3%
060750169001004	303	193	110	36.3%
060750169001005	342	273	69	20.2%
060750169001006	304	229	75	24.7%
060750169001007	252	222	30	11.9%
060750169001008	229	172	57	24.9%
060750169002000	37	21	16	43.2%
060750169002001	208	164	44	21.2%
060750169002002	259	210	49	18.9%
060750169002003	161	114	47	29.2%
060750169002004	139	106	33	23.7%
060750169002005	175	146	29	16.6%
060750169002006	131	102	29	22.1%
060750170001000	175	137	38	21.7%
060750170001001	176	147	29	16.5%
060750170001002	170	145	25	14.7%
060750170001003	120	110	10	8.3%
060750170001004	59	52	7	11.9%
060750170001005	235	190	45	19.1%
060750170001006	10	9	1	10.0%
060750170002000	111	100	11	9.9%
060750170002001	262	220	42	16.0%
060750170002002	119	94	25	21.0%
060750170002003	728	572	156	21.4%
060750170002004	57	48	9	15.8%
060750170002005	125	114	11	8.8%
060750170002006	418	363	55	13.2%
060750170002007	8	7	1	12.5%
060750170002008	164	119	45	27.4%
060750170003000	62	52	10	16.1%
060750170003001	144	120	24	16.7%
060750170003002	263	221	42	16.0%
060750170003003	97	88	9	9.3%
060750170003004	83	71	12	14.5%
060750170003005	189	150	39	20.6%
060750171001000	108	33	75	69.4%
060750171001001	274	217	57	20.8%
060750171001002	263	213	50	19.0%
060750171001003	242	205	37	15.3%
060750171001004	169	119	50	29.6%
060750171001005	251	193	58	23.1%
060750171002000	55	44	11	20.0%
060750171002001	136	112	24	17.6%
060750171002002	157	133	24	15.3%
060750171002003	204	176	28	13.7%
060750171002004	367	282	85	23.2%
060750171002005	374	301	73	19.5%
060750171003000	83	71	12	14.5%
060750171003001	154	137	17	11.0%
060750171003002	262	225	37	14.1%
060750171003003	272	235	37	13.6%
060750171003004	107	73	34	31.8%
060750171003005	133	100	33	24.8%
060750171004000	112	85	27	24.1%
060750171004001	63	49	14	22.2%
060750171004002	147	106	41	27.9%
060750171004004	94	76	18	19.1%
060750171004005	113	91	22	19.5%
060750171004006	98	70	28	28.6%
060750171005000	226	181	45	19.9%
060750171005001	185	159	26	14.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750171005002	196	168	28	14.3%
060750171005003	141	103	38	27.0%
060750171005004	134	107	27	20.1%
060750171005005	138	111	27	19.6%
060750171005006	167	147	20	12.0%
060750171006000	510	314	196	38.4%
060750171006001	289	213	76	26.3%
060750171006002	134	95	39	29.1%
060750171006003	180	125	55	30.6%
060750171006004	196	141	55	28.1%
060750171006005	141	81	60	42.6%
060750171006006	388	314	74	19.1%
060750176011003	297	90	207	69.7%
060750176011007	11	7	4	36.4%
060750176012000	72	19	53	73.6%
060750176012001	76	20	56	73.7%
060750176012002	14	3	11	78.6%
060750176012003	492	205	287	58.3%
060750176012004	80	24	56	70.0%
060750176012005	495	47	448	90.5%
060750176012006	136	54	82	60.3%
060750176012007	388	99	289	74.5%
060750176012008	397	101	296	74.6%
060750176012009	275	54	221	80.4%
060750176012010	446	144	302	67.7%
060750176012011	89	24	65	73.0%
060750176012012	288	54	234	81.3%
060750176013000	148	56	92	62.2%
060750176013001	334	92	242	72.5%
060750176013003	753	290	463	61.5%
060750176013004	194	89	105	54.1%
060750176013005	31	21	10	32.3%
060750176013006	87	28	59	67.8%
060750176013007	239	54	185	77.4%
060750176013008	160	56	104	65.0%
060750176014000	70	45	25	35.7%
060750176014001	13	0	13	100.0%
060750176014002	10	0	10	100.0%
060750176014003	2	0	2	100.0%
060750176014004	26	8	18	69.2%
060750176014006	77	44	33	42.9%
060750176014007	44	31	13	29.5%
060750176014008	12	10	2	16.7%
060750176021002	327	222	105	32.1%
060750176021003	3	3	0	0.0%
060750176021004	6	2	4	66.7%
060750176021005	4	4	0	0.0%
060750176021006	2	1	1	50.0%
060750176021007	4	2	2	50.0%
060750176021008	8	4	4	50.0%
060750176021010	27	8	19	70.4%
060750176021014	8	4	4	50.0%
060750176022002	46	16	30	65.2%
060750176022003	6	1	5	83.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750176022006	4	0	4	100.0%
060750176022007	2	2	0	0.0%
060750176022009	8	3	5	62.5%
060750176022012	3	0	3	100.0%
060750176022013	2	1	1	50.0%
060750176022024	6	1	5	83.3%
060750176022026	16	10	6	37.5%
060750176022027	42	9	33	78.6%
060750176022028	10	1	9	90.0%
060750177001008	6	2	4	66.7%
060750177001028	17	0	17	100.0%
060750177001030	75	51	24	32.0%
060750177001035	58	30	28	48.3%
060750177002000	16	12	4	25.0%
060750177002001	62	24	38	61.3%
060750177002002	58	18	40	69.0%
060750177002003	75	23	52	69.3%
060750177002004	47	40	7	14.9%
060750177002005	41	11	30	73.2%
060750177002006	7	2	5	71.4%
060750177002007	159	77	82	51.6%
060750177002008	44	8	36	81.8%
060750177002009	60	17	43	71.7%
060750177002014	102	42	60	58.8%
060750177002015	22	6	16	72.7%
060750177002016	79	59	20	25.3%
060750177002020	23	12	11	47.8%
060750177002022	13	7	6	46.2%
060750177002023	17	9	8	47.1%
060750177002024	16	1	15	93.8%
060750177002025	318	46	272	85.5%
060750177002026	230	55	175	76.1%
060750177002027	169	52	117	69.2%
060750177002029	59	13	46	78.0%
060750177002032	4	4	0	0.0%
060750178001001	616	133	483	78.4%
060750178001002	126	10	116	92.1%
060750178001003	268	92	176	65.7%
060750178002000	597	253	344	57.6%
060750178002001	207	19	188	90.8%
060750178002002	171	100	71	41.5%
060750178002003	13	7	6	46.2%
060750178002004	426	98	328	77.0%
060750178002005	29	17	12	41.4%
060750178003000	99	59	40	40.4%
060750178003001	92	61	31	33.7%
060750178003002	53	17	36	67.9%
060750178003003	41	35	6	14.6%
060750178003004	264	75	189	71.6%
060750178003005	112	53	59	52.7%
060750178003006	221	91	130	58.8%
060750178003007	246	76	170	69.1%
060750178003008	138	64	74	53.6%
060750178003009	109	49	60	55.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750178003010	137	54	83	60.6%
060750178003011	97	47	50	51.5%
060750178003012	130	61	69	53.1%
060750178003013	205	85	120	58.5%
060750178003014	176	131	45	25.6%
060750178003015	1	0	1	100.0%
060750178003016	37	25	12	32.4%
060750178003017	25	17	8	32.0%
060750178003020	251	39	212	84.5%
060750178003021	24	11	13	54.2%
060750178003022	55	34	21	38.2%
060750178004000	17	6	11	64.7%
060750178004001	60	42	18	30.0%
060750178004002	201	86	115	57.2%
060750178004003	47	18	29	61.7%
060750178004004	51	41	10	19.6%
060750178004005	90	21	69	76.7%
060750178004006	161	33	128	79.5%
060750178004007	19	11	8	42.1%
060750178004008	159	73	86	54.1%
060750178004009	58	16	42	72.4%
060750179011006	1	0	1	100.0%
060750179011007	12	7	5	41.7%
060750179011009	70	47	23	32.9%
060750179011011	446	316	130	29.1%
060750179011013	82	66	16	19.5%
060750179011014	342	218	124	36.3%
060750179011015	15	5	10	66.7%
060750179011016	427	307	120	28.1%
060750179011020	20	3	17	85.0%
060750179011022	134	106	28	20.9%
060750179012002	474	308	166	35.0%
060750179012003	691	475	216	31.3%
060750179012004	459	255	204	44.4%
060750179012005	702	531	171	24.4%
060750179012006	2	1	1	50.0%
060750179012008	51	36	15	29.4%
060750179012009	62	52	10	16.1%
060750179013000	23	22	1	4.3%
060750179013001	49	2	47	95.9%
060750179013002	83	45	38	45.8%
060750179013003	2	2	0	0.0%
060750179013004	53	33	20	37.7%
060750179013010	559	303	256	45.8%
060750179013011	262	107	155	59.2%
060750179013012	2	2	0	0.0%
060750179013013	96	42	54	56.3%
060750179013014	25	8	17	68.0%
060750179013015	17	13	4	23.5%
060750179013016	1	0	1	100.0%
060750179013017	33	26	7	21.2%
060750179014005	86	58	28	32.6%
060750179014006	103	74	29	28.2%
060750179014008	8	6	2	25.0%
060750179014009	16	12	4	25.0%
060750179021000	241	163	78	32.4%
060750179021001	56	41	15	26.8%
060750179021002	106	78	28	26.4%
060750179021004	248	154	94	37.9%
060750179021005	10	9	1	10.0%
060750179021012	188	125	63	33.5%
060750179021013	87	68	19	21.8%
060750179021015	42	27	15	35.7%
060750179021017	109	58	51	46.8%
060750179021018	56	18	38	67.9%
060750179021019	12	1	11	91.7%
060750179021021	2	0	2	100.0%
060750179021034	186	66	120	64.5%
060750179021037	5	5	0	0.0%
060750179021041	5	5	0	0.0%
060750179021046	22	17	5	22.7%
060750179021048	4	2	2	50.0%
060750179021050	74	61	13	17.6%
060750180001001	166	59	107	64.5%
060750180001002	25	18	7	28.0%
060750180001003	4	0	4	100.0%
060750180001006	26	19	7	26.9%
060750180001007	8	8	0	0.0%
060750180001016	65	46	19	29.2%
060750180001018	52	37	15	28.8%
060750180001021	10	8	2	20.0%
060750180001022	40	30	10	25.0%
060750180001023	18	12	6	33.3%
060750180001024	30	14	16	53.3%
060750180002000	116	97	19	16.4%
060750180002002	27	7	20	74.1%
060750180002003	2	1	1	50.0%
060750180002008	1232	290	942	76.5%
060750180002009	86	44	42	48.8%
060750180002010	13	11	2	15.4%
060750180002011	1	1	0	0.0%
060750180002012	69	28	41	59.4%
060750180002014	6	5	1	16.7%
060750180002015	169	68	101	59.8%
060750180002016	62	9	53	85.5%
060750180002017	54	45	9	16.7%
060750180002021	4	0	4	100.0%
060750201001000	4	2	2	50.0%
060750201001001	203	116	87	42.9%
060750201001002	119	80	39	32.8%
060750201001003	78	32	46	59.0%
060750201001005	27	23	4	14.8%
060750201001009	15	5	10	66.7%
060750201001010	22	11	11	50.0%
060750201001011	120	43	77	64.2%
060750201001012	17	14	3	17.6%
060750201001013	266	106	160	60.2%
060750201002000	644	147	497	77.2%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750201002001	184	57	127	69.0%
060750201002003	329	26	303	92.1%
060750201002005	149	46	103	69.1%
060750201002006	298	74	224	75.2%
060750201003000	266	38	228	85.7%
060750201003001	303	84	219	72.3%
060750201003002	303	40	263	86.8%
060750201003003	226	26	200	88.5%
060750201003004	344	47	297	86.3%
060750201003005	92	4	88	95.7%
060750201004000	875	153	722	82.5%
060750201004001	406	49	357	87.9%
060750201004002	295	46	249	84.4%
060750201004003	363	57	306	84.3%
060750201004004	117	29	88	75.2%
060750201004005	175	78	97	55.4%
060750201004006	100	3	97	97.0%
060750202001001	181	17	164	90.6%
060750202001002	259	154	105	40.5%
060750202001003	90	65	25	27.8%
060750202001005	174	127	47	27.0%
060750202001006	34	32	2	5.9%
060750202001007	125	80	45	36.0%
060750202001008	359	187	172	47.9%
060750202002000	155	92	63	40.6%
060750202002001	224	152	72	32.1%
060750202002002	213	163	50	23.5%
060750202002003	307	218	89	29.0%
060750202002004	344	169	175	50.9%
060750202002005	826	126	700	84.7%
060750202002006	279	151	128	45.9%
060750202003000	511	116	395	77.3%
060750202003001	200	108	92	46.0%
060750202003002	623	376	247	39.6%
060750202003003	415	215	200	48.2%
060750202003004	195	118	77	39.5%
060750202003005	399	154	245	61.4%
060750202003006	63	44	19	30.2%
060750202003007	212	126	86	40.6%
060750203001000	84	64	20	23.8%
060750203001001	255	181	74	29.0%
060750203001002	306	212	94	30.7%
060750203001003	92	41	51	55.4%
060750203001004	275	186	89	32.4%
060750203001005	377	222	155	41.1%
060750203002000	5	3	2	40.0%
060750203002001	78	64	14	17.9%
060750203002002	190	132	58	30.5%
060750203002003	77	54	23	29.9%
060750203002004	150	110	40	26.7%
060750203002005	144	84	60	41.7%
060750203003000	81	54	27	33.3%
060750203003001	261	178	83	31.8%
060750203003002	341	202	139	40.8%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750203003003	144	110	34	23.6%
060750203003004	157	110	47	29.9%
060750203003005	128	102	26	20.3%
060750204001000	47	37	10	21.3%
060750204001002	85	70	15	17.6%
060750204001003	84	70	14	16.7%
060750204001004	173	135	38	22.0%
060750204001005	48	38	10	20.8%
060750204001006	16	7	9	56.3%
060750204001007	7	7	0	0.0%
060750204001008	37	29	8	21.6%
060750204001009	182	152	30	16.5%
060750204001010	158	129	29	18.4%
060750204001011	25	19	6	24.0%
060750204001012	141	122	19	13.5%
060750204001013	56	50	6	10.7%
060750204001014	23	22	1	4.3%
060750204001015	74	62	12	16.2%
060750204001016	27	22	5	18.5%
060750204002000	114	98	16	14.0%
060750204002001	478	396	82	17.2%
060750204002002	42	36	6	14.3%
060750204002003	160	122	38	23.8%
060750204002004	87	65	22	25.3%
060750204002005	145	116	29	20.0%
060750204002006	80	71	9	11.3%
060750204002007	83	74	9	10.8%
060750204002008	58	47	11	19.0%
060750204002009	337	252	85	25.2%
060750204002010	21	14	7	33.3%
060750204002011	19	14	5	26.3%
060750204002012	114	80	34	29.8%
060750204002013	32	14	18	56.3%
060750204002014	54	46	8	14.8%
060750204003000	522	372	150	28.7%
060750204003002	302	229	73	24.2%
060750204003003	834	583	251	30.1%
060750204003004	298	196	102	34.2%
060750204003005	74	35	39	52.7%
060750204003006	152	86	66	43.4%
060750204003007	5	3	2	40.0%
060750204004000	72	66	6	8.3%
060750204004001	95	74	21	22.1%
060750204004002	99	89	10	10.1%
060750204004003	25	22	3	12.0%
060750204004004	80	63	17	21.3%
060750204004005	1	0	1	100.0%
060750204004006	45	33	12	26.7%
060750204004007	31	22	9	29.0%
060750204004008	30	25	5	16.7%
060750204004009	136	110	26	19.1%
060750204005000	107	94	13	12.1%
060750204005001	150	116	34	22.7%
060750204005002	115	94	21	18.3%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750204005003	89	73	16	18.0%
060750204005005	79	64	15	19.0%
060750204005006	22	20	2	9.1%
060750204005007	47	29	18	38.3%
060750204005008	60	49	11	18.3%
060750204005009	36	27	9	25.0%
060750204005010	55	43	12	21.8%
060750204005011	67	51	16	23.9%
060750204005012	26	22	4	15.4%
060750204005013	66	57	9	13.6%
060750204005014	15	11	4	26.7%
060750205001000	55	46	9	16.4%
060750205001001	19	15	4	21.1%
060750205001002	77	68	9	11.7%
060750205001003	96	77	19	19.8%
060750205001004	147	110	37	25.2%
060750205001005	110	74	36	32.7%
060750205001006	113	87	26	23.0%
060750205001007	156	123	33	21.2%
060750205002000	130	105	25	19.2%
060750205002001	34	22	12	35.3%
060750205002002	188	156	32	17.0%
060750205002003	222	174	48	21.6%
060750205002004	120	96	24	20.0%
060750205002005	216	171	45	20.8%
060750205003000	152	119	33	21.7%
060750205003001	123	97	26	21.1%
060750205003002	114	98	16	14.0%
060750205003003	192	153	39	20.3%
060750205003004	120	111	9	7.5%
060750205003005	167	150	17	10.2%
060750206001000	147	125	22	15.0%
060750206001001	258	202	56	21.7%
060750206001002	400	220	180	45.0%
060750206001003	196	146	50	25.5%
060750206001005	221	173	48	21.7%
060750206001006	198	163	35	17.7%
060750206001007	192	167	25	13.0%
060750206002000	209	167	42	20.1%
060750206002001	151	137	14	9.3%
060750206002002	89	74	15	16.9%
060750206002003	26	23	3	11.5%
060750206002004	69	65	4	5.8%
060750206002005	130	113	17	13.1%
060750206002006	135	104	31	23.0%
060750206003000	124	100	24	19.4%
060750206003001	151	134	17	11.3%
060750206003002	94	87	7	7.4%
060750206003003	171	135	36	21.1%
060750206003004	273	200	73	26.7%
060750206003005	148	117	31	20.9%
060750206004000	167	141	26	15.6%
060750206004001	218	161	57	26.1%
060750206004002	168	134	34	20.2%
060750206004003	137	94	43	31.4%
060750206004004	210	153	57	27.1%
060750206004005	214	166	48	22.4%
060750206004006	184	124	60	32.6%
060750206004007	156	128	28	17.9%
060750207001000	229	126	103	45.0%
060750207001001	345	173	172	49.9%
060750207001002	328	244	84	25.6%
060750207001003	302	172	130	43.0%
060750207001004	247	161	86	34.8%
060750207001005	306	229	77	25.2%
060750207001006	240	134	106	44.2%
060750207001007	158	74	84	53.2%
060750207001008	188	103	85	45.2%
060750207002000	599	319	280	46.7%
060750207002001	265	197	68	25.7%
060750207002002	282	210	72	25.5%
060750207002003	199	152	47	23.6%
060750207002004	252	132	120	47.6%
060750207002005	317	202	115	36.3%
060750207002006	194	144	50	25.8%
060750207003000	315	164	151	47.9%
060750207003001	110	90	20	18.2%
060750207003002	241	174	67	27.8%
060750207003003	118	85	33	28.0%
060750207003004	95	78	17	17.9%
060750207003005	97	85	12	12.4%
060750208001000	287	67	220	76.7%
060750208001001	385	50	335	87.0%
060750208001002	221	38	183	82.8%
060750208001003	229	41	188	82.1%
060750208001004	84	16	68	81.0%
060750208001005	182	59	123	67.6%
060750208001006	126	53	73	57.9%
060750208002000	411	51	360	87.6%
060750208002001	352	114	238	67.6%
060750208002002	466	70	396	85.0%
060750208002003	325	52	273	84.0%
060750208002004	482	95	387	80.3%
060750208002005	241	44	197	81.7%
060750208003000	215	77	138	64.2%
060750208003001	258	54	204	79.1%
060750208003002	294	96	198	67.3%
060750208003003	240	62	178	74.2%
060750208003004	299	107	192	64.2%
060750208003005	221	94	127	57.5%
060750208004000	498	114	384	77.1%
060750208004001	466	119	347	74.5%
060750208004002	176	44	132	75.0%
060750208004003	120	23	97	80.8%
060750208004004	239	59	180	75.3%
060750208004005	155	64	91	58.7%
060750208004006	399	63	336	84.2%
060750209001000	421	120	301	71.5%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750209001001	256	31	225	87.9%
060750209001002	266	66	200	75.2%
060750209001003	434	115	319	73.5%
060750209001004	189	55	134	70.9%
060750209001005	277	68	209	75.5%
060750209001006	170	41	129	75.9%
060750209001007	65	15	50	76.9%
060750209002000	226	56	170	75.2%
060750209002001	138	23	115	83.3%
060750209002002	234	37	197	84.2%
060750209002003	52	12	40	76.9%
060750209002004	181	27	154	85.1%
060750209002005	225	31	194	86.2%
060750209003000	108	8	100	92.6%
060750209003001	124	40	84	67.7%
060750209003002	257	75	182	70.8%
060750209003003	98	41	57	58.2%
060750209003004	86	25	61	70.9%
060750209003005	133	26	107	80.5%
060750209004000	100	74	26	26.0%
060750209004001	186	71	115	61.8%
060750209004002	96	22	74	77.1%
060750209004003	275	91	184	66.9%
060750209004004	66	7	59	89.4%
060750209004005	187	89	98	52.4%
060750209004006	153	48	105	68.6%
060750209004007	89	23	66	74.2%
060750210001000	91	44	47	51.6%
060750210001001	210	145	65	31.0%
060750210001002	138	69	69	50.0%
060750210001003	185	92	93	50.3%
060750210001004	181	102	79	43.6%
060750210001005	75	47	28	37.3%
060750210001006	188	137	51	27.1%
060750210002000	176	85	91	51.7%
060750210002001	195	116	79	40.5%
060750210002002	297	199	98	33.0%
060750210002003	120	71	49	40.8%
060750210002004	116	69	47	40.5%
060750210002005	100	69	31	31.0%
060750210003000	136	60	76	55.9%
060750210003001	170	91	79	46.5%
060750210003002	358	186	172	48.0%
060750210003003	188	131	57	30.3%
060750210003004	203	145	58	28.6%
060750210003005	210	133	77	36.7%
060750210003006	205	158	47	22.9%
060750210004000	240	55	185	77.1%
060750210004001	143	71	72	50.3%
060750210004002	77	42	35	45.5%
060750210004003	160	91	69	43.1%
060750210004004	212	85	127	59.9%
060750210004005	185	80	105	56.8%
060750211001000	192	160	32	16.7%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750211001001	136	116	20	14.7%
060750211001002	95	76	19	20.0%
060750211001003	108	91	17	15.7%
060750211001004	192	144	48	25.0%
060750211001005	133	116	17	12.8%
060750211001006	170	136	34	20.0%
060750211001007	111	77	34	30.6%
060750211002000	227	170	57	25.1%
060750211002001	248	179	69	27.8%
060750211002002	51	35	16	31.4%
060750211002003	54	41	13	24.1%
060750211002004	65	49	16	24.6%
060750211002005	50	36	14	28.0%
060750211002006	86	77	9	10.5%
060750211002007	89	68	21	23.6%
060750211003000	171	140	31	18.1%
060750211003001	172	134	38	22.1%
060750211003002	175	151	24	13.7%
060750211003003	170	138	32	18.8%
060750211003004	161	119	42	26.1%
060750211003005	145	103	42	29.0%
060750211004000	100	88	12	12.0%
060750211004001	150	133	17	11.3%
060750211004002	163	131	32	19.6%
060750211004003	147	122	25	17.0%
060750211004004	137	114	23	16.8%
060750211004005	135	101	34	25.2%
060750212001000	127	110	17	13.4%
060750212001001	121	100	21	17.4%
060750212001002	115	101	14	12.2%
060750212001003	130	105	25	19.2%
060750212001004	239	183	56	23.4%
060750212001005	115	100	15	13.0%
060750212002000	162	131	31	19.1%
060750212002001	148	125	23	15.5%
060750212002002	160	133	27	16.9%
060750212002003	128	105	23	18.0%
060750212002005	135	96	39	28.9%
060750212002006	100	89	11	11.0%
060750212002007	191	137	54	28.3%
060750212002008	143	119	24	16.8%
060750212003000	129	99	30	23.3%
060750212003001	108	82	26	24.1%
060750212003002	58	43	15	25.9%
060750212003003	151	122	29	19.2%
060750212003004	77	63	14	18.2%
060750212003005	142	129	13	9.2%
060750212003006	114	94	20	17.5%
060750212003007	89	61	28	31.5%
060750213001000	166	124	42	25.3%
060750213001001	160	125	35	21.9%
060750213001002	135	107	28	20.7%
060750213001003	182	149	33	18.1%
060750213001004	144	97	47	32.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
60750213001005	130	103	27	20.8%
60750213001006	153	108	45	29.4%
60750213002000	140	101	39	27.9%
60750213002001	125	101	24	19.2%
60750213002002	121	91	30	24.8%
60750213002003	160	133	27	16.9%
60750213002004	126	105	21	16.7%
60750213002005	152	125	27	17.8%
60750213002006	83	66	17	20.5%
60750213002007	133	108	25	18.8%
60750213002008	60	51	9	15.0%
60750213002009	122	96	26	21.3%
60750213002010	110	94	16	14.5%
60750214001000	75	59	16	21.3%
60750214001001	76	69	7	9.2%
60750214001002	120	89	31	25.8%
60750214001003	64	44	20	31.3%
60750214001004	94	82	12	12.8%
60750214001005	107	76	31	29.0%
60750214001006	199	157	42	21.1%
60750214002000	157	112	45	28.7%
60750214002001	158	108	50	31.6%
60750214002002	205	137	68	33.2%
60750214002003	160	117	43	26.9%
60750214002004	185	125	60	32.4%
60750214002005	158	126	32	20.3%
60750214002006	126	104	22	17.5%
60750214002007	182	142	40	22.0%
60750214003000	136	116	20	14.7%
60750214003001	146	101	45	30.8%
60750214003002	195	128	67	34.4%
60750214003003	168	134	34	20.2%
60750214003004	215	151	64	29.8%
60750214003006	228	166	62	27.2%
60750214003007	131	120	11	8.4%
60750215001000	91	29	62	68.1%
60750215001001	244	142	102	41.8%
60750215001002	204	132	72	35.3%
60750215001003	167	120	47	28.1%
60750215001004	237	144	93	39.2%
60750215001005	105	35	70	66.7%
60750215002000	19	2	17	89.5%
60750215002001	212	128	84	39.6%
60750215002002	193	144	49	25.4%
60750215002003	217	131	86	39.6%
60750215002004	255	112	143	56.1%
60750215002005	196	109	87	44.4%
60750215002006	143	100	43	30.1%
60750215003000	179	85	94	52.5%
60750215003001	159	116	43	27.0%
60750215003002	215	148	67	31.2%
60750215003003	107	50	57	53.3%
60750215003004	36	22	14	38.9%
60750215003005	171	115	56	32.7%
060750215004000	193	146	47	24.4%
060750215004001	149	125	24	16.1%
060750215004002	158	122	36	22.8%
060750215004003	135	53	82	60.7%
060750215004004	246	136	110	44.7%
060750215004005	208	143	65	31.3%
060750215005000	168	120	48	28.6%
060750215005001	149	118	31	20.8%
060750215005002	147	101	46	31.3%
060750215005003	80	66	14	17.5%
060750215005004	99	63	36	36.4%
060750215005005	183	134	49	26.8%
060750215005006	130	107	23	17.7%
060750216001000	193	149	44	22.8%
060750216001001	115	83	32	27.8%
060750216001002	88	75	13	14.8%
060750216001003	86	68	18	20.9%
060750216001004	77	66	11	14.3%
060750216001005	27	24	3	11.1%
060750216001006	126	97	29	23.0%
060750216001007	163	132	31	19.0%
060750216001008	90	73	17	18.9%
060750216001009	94	86	8	8.5%
060750216001010	96	73	23	24.0%
060750216001011	149	91	58	38.9%
060750216001012	156	135	21	13.5%
060750216001013	72	45	27	37.5%
060750216001014	124	105	19	15.3%
060750216001015	64	55	9	14.1%
060750216002000	299	180	119	39.8%
060750216002001	648	430	218	33.6%
060750216002002	109	54	55	50.5%
060750216002003	43	17	26	60.5%
060750216002004	128	47	81	63.3%
060750216002005	52	29	23	44.2%
060750216002006	95	44	51	53.7%
060750216002007	167	65	102	61.1%
060750216002008	121	77	44	36.4%
060750216002009	498	163	335	67.3%
060750217001000	79	63	16	20.3%
060750217001001	89	62	27	30.3%
060750217001002	123	106	17	13.8%
060750217001003	159	116	43	27.0%
060750217001004	265	134	131	49.4%
060750217001005	158	74	84	53.2%
060750217001006	169	96	73	43.2%
060750217001007	267	171	96	36.0%
060750217001008	99	51	48	48.5%
060750217001009	290	133	157	54.1%
060750217001010	239	64	175	73.2%
060750217001011	357	119	238	66.7%
060750217001012	224	36	188	83.9%
060750217001013	94	61	33	35.1%
060750217001014	23	19	4	17.4%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750217001015	229	134	95	41.5%
060750217001016	80	24	56	70.0%
060750217001017	57	32	25	43.9%
060750217001018	61	39	22	36.1%
060750217002000	56	41	15	26.8%
060750217002001	52	37	15	28.8%
060750217002002	143	87	56	39.2%
060750217002003	103	79	24	23.3%
060750217002004	87	55	32	36.8%
060750217002005	78	31	47	60.3%
060750217002006	83	35	48	57.8%
060750217002007	63	55	8	12.7%
060750217002008	82	56	26	31.7%
060750217002009	178	123	55	30.9%
060750217002010	52	32	20	38.5%
060750217002011	31	26	5	16.1%
060750217002012	15	15	0	0.0%
060750217002013	54	38	16	29.6%
060750218001000	59	23	36	61.0%
060750218001001	159	93	66	41.5%
060750218001002	278	188	90	32.4%
060750218001003	249	177	72	28.9%
060750218001004	239	156	83	34.7%
060750218001005	141	95	46	32.6%
060750218001006	102	88	14	13.7%
060750218002001	136	75	61	44.9%
060750218002002	142	95	47	33.1%
060750218002003	156	130	26	16.7%
060750218002004	194	160	34	17.5%
060750218002005	9	1	8	88.9%
060750218002006	67	44	23	34.3%
060750218002007	126	87	39	31.0%
060750218002008	64	46	18	28.1%
060750218002009	127	92	35	27.6%
060750218002010	20	14	6	30.0%
060750218003000	47	38	9	19.1%
060750218003001	104	69	35	33.7%
060750218003002	85	62	23	27.1%
060750218003003	89	56	33	37.1%
060750218003004	86	42	44	51.2%
060750218003005	88	53	35	39.8%
060750218003006	130	74	56	43.1%
060750218003007	78	32	46	59.0%
060750218004001	145	94	51	35.2%
060750218004002	129	89	40	31.0%
060750218004003	70	54	16	22.9%
060750218004004	150	116	34	22.7%
060750218004005	112	79	33	29.5%
060750218004006	66	52	14	21.2%
060750218004007	70	54	16	22.9%
060750218004008	53	26	27	50.9%
060750218004009	36	23	13	36.1%
060750218004010	40	17	23	57.5%
060750218004011	44	33	11	25.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750218004012	23	19	4	17.4%
060750218004014	1	0	1	100.0%
060750226001000	14	8	6	42.9%
060750226001001	38	25	13	34.2%
060750226001009	19	14	5	26.3%
060750226001010	118	82	36	30.5%
060750226001011	14	13	1	7.1%
060750226001013	9	3	6	66.7%
060750226001015	76	62	14	18.4%
060750226001016	73	58	15	20.5%
060750226002000	19	4	15	78.9%
060750226002003	1	0	1	100.0%
060750226002009	91	55	36	39.6%
060750226002010	129	94	35	27.1%
060750226002011	43	33	10	23.3%
060750226002012	121	79	42	34.7%
060750226003010	6	3	3	50.0%
060750226003012	61	34	27	44.3%
060750226003018	10	7	3	30.0%
060750226003019	4	4	0	0.0%
060750227011004	84	53	31	36.9%
060750227011005	102	84	18	17.6%
060750227011006	73	59	14	19.2%
060750227011007	38	23	15	39.5%
060750227011010	43	35	8	18.6%
060750227011011	106	80	26	24.5%
060750227011012	138	90	48	34.8%
060750227011013	13	10	3	23.1%
060750227012000	195	159	36	18.5%
060750227012001	147	120	27	18.4%
060750227012002	82	64	18	22.0%
060750227012003	98	81	17	17.3%
060750227012004	101	83	18	17.8%
060750227012005	96	79	17	17.7%
060750227012006	165	133	32	19.4%
060750227012007	203	171	32	15.8%
060750227012008	95	71	24	25.3%
060750227012009	104	86	18	17.3%
060750227012010	172	127	45	26.2%
060750227012011	151	123	28	18.5%
060750227012012	54	44	10	18.5%
060750227012013	96	83	13	13.5%
060750227013000	7	3	4	57.1%
060750227013001	113	86	27	23.9%
060750227013002	105	89	16	15.2%
060750227013003	92	69	23	25.0%
060750227013004	44	36	8	18.2%
060750227013006	34	10	24	70.6%
060750227021000	24	18	6	25.0%
060750227021001	45	38	7	15.6%
060750227021002	40	17	23	57.5%
060750227021003	77	55	22	28.6%
060750227021004	104	81	23	22.1%
060750227021005	129	95	34	26.4%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
)60750227021006	116	92	24	20.7%
)60750227021007	116	74	42	36.2%
)60750227021008	93	66	27	29.0%
)60750227021009	77	56	21	27.3%
)60750227022000	54	13	41	75.9%
)60750227022001	118	87	31	26.3%
)60750227022002	110	81	29	26.4%
)60750227022003	116	95	21	18.1%
)60750227022004	70	59	11	15.7%
)60750227022005	102	77	25	24.5%
)60750227022006	68	49	19	27.9%
)60750227022007	98	70	28	28.6%
)60750227022008	26	19	7	26.9%
)60750227022009	72	62	10	13.9%
)60750227022010	103	68	35	34.0%
)60750227022011	47	35	12	25.5%
)60750227031000	116	95	21	18.1%
)60750227031001	187	126	61	32.6%
)60750227031002	134	66	68	50.7%
060750227031003	199	157	42	21.1%
060750227031004	212	155	57	26.9%
060750227031005	240	147	93	38.8%
060750227032000	112	74	38	33.9%
060750227032001	207	129	78	37.7%
060750227032002	133	81	52	39.1%
060750227032003	115	76	39	33.9%
060750227032004	405	270	135	33.3%
060750227032005	764	67	697	91.2%
060750227032006	18	17	1	5.6%
060750227032008	31	22	9	29.0%
060750227032012	14	5	9	64.3%
060750227033000	414	13	401	96.9%
060750227033001	413	24	389	94.2%
060750227033003	33	17	16	48.5%
060750227033004	136	86	50	36.8%
060750227033006	306	208	98	32.0%
060750227033007	4	0	4	100.0%
060750227033008	138	92	46	33.3%
060750227033009	116	84	32	27.6%
060750227033010	64	50	14	21.9%
060750227033011	104	62	42	40.4%
060750227033012	152	67	85	55.9%
060750227033013	51	20	31	60.8%
060750227033014	50	16	34	68.0%
060750227033015	272	5	267	98.2%
060750228011003	73	54	19	26.0%
060750228011004	7	1	6	85.7%
060750228011005	26	23	3	11.5%
060750228011007	190	19	171	90.0%
060750228011008	149	69	80	53.7%
060750228011009	25	13	12	48.0%
060750228011013	58	49	9	15.5%
060750228011018	181	59	122	67.4%
060750228011019	13	13	0	0.0%
060750228011020	58	13	45	77.6%
060750228012000	111	35	76	68.5%
060750228012001	5	4	1	20.0%
060750228012002	96	48	48	50.0%
060750228012003	18	12	6	33.3%
060750228012004	8	8	0	0.0%
060750228012005	358	55	303	84.6%
060750228012006	273	72	201	73.6%
060750228012007	496	72	424	85.5%
060750228012008	318	71	247	77.7%
060750228012009	268	65	203	75.7%
060750228013001	248	54	194	78.2%
060750228013002	143	13	130	90.9%
060750228013003	328	101	227	69.2%
060750228013004	214	100	114	53.3%
060750228013005	388	57	331	85.3%
060750228013006	303	105	198	65.3%
060750228013007	321	51	270	84.1%
060750228021000	46	32	14	30.4%
060750228021001	99	66	33	33.3%
060750228021002	107	65	42	39.3%
060750228021003	5	3	2	40.0%
060750228021004	201	10	191	95.0%
060750228021005	117	64	53	45.3%
060750228021006	36	14	22	61.1%
060750228022001	153	48	105	68.6%
060750228022002	246	80	166	67.5%
060750228022003	251	92	159	63.3%
060750228022004	148	76	72	48.6%
060750228022005	17	6	11	64.7%
060750228022006	336	57	279	83.0%
060750228031000	104	18	86	82.7%
060750228031001	308	73	235	76.3%
060750228031002	232	88	144	62.1%
060750228031003	452	161	291	64.4%
060750228031004	383	109	274	71.5%
060750228031005	269	32	237	88.1%
060750228031006	172	61	111	64.5%
060750228031007	75	17	58	77.3%
060750228032000	355	49	306	86.2%
060750228032001	348	109	239	68.7%
060750228032002	333	47	286	85.9%
060750228032003	405	53	352	86.9%
060750228032004	178	47	131	73.6%
060750228032005	280	52	228	81.4%
060750228032006	312	77	235	75.3%
060750228032007	338	55	283	83.7%
060750228032008	284	46	238	83.8%
060750228032009	350	51	299	85.4%
060750229011000	330	66	264	80.0%
060750229011001	231	42	189	81.8%
060750229011002	419	39	380	90.7%
060750229011003	283	89	194	68.6%
060750229011004	386	115	271	70.2%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750229011005	386	110	276	71.5%
060750229012000	272	54	218	80.1%
060750229012001	216	28	188	87.0%
060750229012002	281	68	213	75.8%
060750229012003	353	48	305	86.4%
060750229012004	246	26	220	89.4%
060750229012005	219	55	164	74.9%
060750229012006	7	1	6	85.7%
060750229013000	146	33	113	77.4%
060750229013001	130	33	97	74.6%
060750229013002	111	40	71	64.0%
060750229013003	229	62	167	72.9%
060750229013004	285	0	285	100.0%
060750229013005	435	12	423	97.2%
060750229021000	245	70	175	71.4%
060750229021001	296	58	238	80.4%
060750229021002	349	56	293	84.0%
060750229021003	235	59	176	74.9%
060750229021004	94	15	79	84.0%
060750229021005	266	82	184	69.2%
060750229022000	230	54	176	76.5%
060750229022001	269	39	230	85.5%
060750229022002	342	61	281	82.2%
060750229022003	188	44	144	76.6%
060750229022004	205	31	174	84.9%
060750229022005	206	39	167	81.1%
060750229031000	261	34	227	87.0%
060750229031001	258	69	189	73.3%
060750229031002	355	36	319	89.9%
060750229031003	333	55	278	83.5%
060750229031004	258	65	193	74.8%
060750229031005	340	35	305	89.7%
060750229032000	87	37	50	57.5%
060750229032001	209	72	137	65.6%
060750229032003	135	68	67	49.6%
060750229032004	279	70	209	74.9%
060750229032005	178	85	93	52.2%
060750229032006	202	56	146	72.3%
060750229033000	142	36	106	74.6%
060750229033001	331	54	277	83.7%
060750229033002	236	100	136	57.6%
060750229033003	181	37	144	79.6%
060750229033004	157	18	139	88.5%
060750230011000	213	7	206	96.7%
060750230011001	74	4	70	94.6%
060750230011005	15	3	12	80.0%
060750230011012	667	46	621	93.1%
060750230011013	8	0	8	100.0%
060750230011014	16	0	16	100.0%
060750230011015	155	6	149	96.1%
060750230011016	147	7	140	95.2%
060750230011017	73	4	69	94.5%
060750230011018	151	22	129	85.4%
060750230011019	185	9	176	95.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750230011020	10	0	10	100.0%
060750230011021	70	6	64	91.4%
060750230011022	112	5	107	95.5%
060750230011023	82	4	78	95.1%
060750230011024	21	2	19	90.5%
060750230012000	17	2	15	88.2%
060750230012001	103	2	101	98.1%
060750230012002	79	5	74	93.7%
060750230012003	151	12	139	92.1%
060750230012004	65	5	60	92.3%
060750230012005	206	5	201	97.6%
060750230012006	237	24	213	89.9%
060750230012007	217	16	201	92.6%
060750230012008	375	39	336	89.6%
060750230012009	170	13	157	92.4%
060750230012010	140	7	133	95.0%
060750230012011	582	47	535	91.9%
060750230012012	232	21	211	90.9%
060750230012013	37	4	33	89.2%
060750230012015	211	20	191	90.5%
060750230012016	203	14	189	93.1%
060750230012017	59	8	51	86.4%
060750230021000	115	7	108	93.9%
060750230021001	291	6	285	97.9%
060750230021002	190	12	178	93.7%
060750230021003	287	3	284	99.0%
060750230021004	214	10	204	95.3%
060750230021005	191	19	172	90.1%
060750230021006	43	2	41	95.3%
060750230021007	44	1	43	97.7%
060750230021008	55	4	51	92.7%
060750230021009	186	8	178	95.7%
060750230021010	105	1	104	99.0%
060750230021011	34	0	34	100.0%
060750230021012	27	0	27	100.0%
060750230021013	19	0	19	100.0%
060750230021014	182	6	176	96.7%
060750230021015	198	21	177	89.4%
060750230021016	149	21	128	85.9%
060750230031000	680	50	630	92.6%
060750230031001	79	9	70	88.6%
060750230031002	450	40	410	91.1%
060750230031003	56	6	50	89.3%
060750230031004	181	14	167	92.3%
060750230031005	21	6	15	71.4%
060750230031006	157	5	152	96.8%
060750230031007	206	7	199	96.6%
060750230031008	187	18	169	90.4%
060750230031009	170	19	151	88.8%
060750230031010	158	11	147	93.0%
060750230031011	126	8	118	93.7%
060750230031012	109	6	103	94.5%
060750230031013	169	3	166	98.2%
060750230032000	133	8	125	94.0%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
60750230032001	173	5	168	97.1%
60750230032002	173	8	165	95.4%
60750230032004	217	24	193	88.9%
60750230032005	134	8	126	94.0%
60750230032006	170	5	165	97.1%
60750230032007	180	5	175	97.2%
60750230032008	85	2	83	97.6%
60750230032009	14	1	13	92.9%
60750231011000	37	7	30	81.1%
60750231011002	99	10	89	89.9%
60750231011003	2	1	1	50.0%
60750231011004	216	27	189	87.5%
60750231011006	146	2	144	98.6%
60750231011007	87	8	79	90.8%
60750231011008	81	0	81	100.0%
60750231011009	74	1	73	98.6%
60750231011010	133	5	128	96.2%
60750231011011	137	14	123	89.8%
60750231011012	13	0	13	100.0%
60750231011014	15	0	15	100.0%
60750231011015	191	1	190	99.5%
60750231021000	257	40	217	84.4%
60750231021001	810	18	792	97.8%
60750231021002	171	11	160	93.6%
60750231021003	270	32	238	88.1%
60750231021004	160	0	160	100.0%
60750231021005	237	2	235	99.2%
60750231021006	200	0	200	100.0%
60750231021007	42	0	42	100.0%
60750231021008	115	0	115	100.0%
60750231021009	711	14	697	98.0%
60750231021010	257	4	253	98.4%
60750231021011	63	1	62	98.4%
60750231021012	161	5	156	96.9%
60750231021013	146	8	138	94.5%
60750231031000	103	24	79	76.7%
60750231031001	407	8	399	98.0%
60750231031002	1396	10	1386	99.3%
60750231031003	143	2	141	98.6%
60750231031005	548	30	518	94.5%
60750231031006	177	2	175	98.9%
060750231031007	442	15	427	96.6%
060750231031008	768	7	761	99.1%
060750231031010	113	0	113	100.0%
060750231031011	221	14	207	93.7%
060750231031012	331	0	331	100.0%
060750232001000	6	3	3	50.0%
060750232001002	48	0	48	100.0%
060750232001003	19	0	19	100.0%
060750232001005	27	3	24	88.9%
060750232001006	13	1	12	92.3%
060750232001007	117	1	116	99.1%
060750232001008	169	9	160	94.7%
060750232001009	113	0	113	100.0%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750232001012	2	0	2	100.0%
060750232001016	9	4	5	55.6%
060750232001017	5	2	3	60.0%
060750232001022	10	3	7	70.0%
060750232001023	7	2	5	71.4%
060750232002000	146	0	146	100.0%
060750232002001	180	5	175	97.2%
060750232002002	152	3	149	98.0%
060750232002003	200	4	196	98.0%
060750232002004	185	3	182	98.4%
060750232002005	165	4	161	97.6%
060750232003000	203	8	195	96.1%
060750232003001	134	7	127	94.8%
060750232003002	129	6	123	95.3%
060750232003003	201	3	198	98.5%
060750232003004	192	6	186	96.9%
060750232003005	239	10	229	95.8%
060750232004000	196	11	185	94.4%
060750232004001	187	7	180	96.3%
060750232004002	184	4	180	97.8%
060750232004003	179	7	172	96.1%
060750232004004	150	7	143	95.3%
060750232004005	189	7	182	96.3%
060750232005000	147	8	139	94.6%
060750232005001	141	18	123	87.2%
060750232005002	109	1	108	99.1%
060750232005003	58	0	58	100.0%
060750232005004	25	8	17	68.0%
060750232005005	10	0	10	100.0%
060750232005006	7	0	7	100.0%
060750232005007	117	5	112	95.7%
060750232005008	92	13	79	85.9%
060750232005010	28	4	24	85.7%
060750233001000	39	2	37	94.9%
060750233001002	29	0	29	100.0%
060750233001003	40	10	30	75.0%
060750233001005	172	13	159	92.4%
060750233001006	159	4	155	97.5%
060750233001007	4	0	4	100.0%
060750233001008	206	22	184	89.3%
060750233001009	420	8	412	98.1%
060750233001010	190	10	180	94.7%
060750233001013	90	2	88	97.8%
060750233001014	58	0	58	100.0%
060750233001015	113	12	101	89.4%
060750233001016	224	7	217	96.9%
060750233001017	191	13	178	93.2%
060750233001019	82	1	81	98.8%
060750233001020	134	10	124	92.5%
060750233001021	20	0	20	100.0%
060750233001022	8	1	7	87.5%
060750233001023	66	1	65	98.5%
060750233001024	43	0	43	100.0%
060750233001025	74	1	73	98.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750233001027	56	2	54	96.4%
060750233001028	173	10	163	94.2%
060750234001000	1	0	1	100.0%
060750234001001	249	0	249	100.0%
060750234001002	282	3	279	98.9%
060750234001003	358	9	349	97.5%
060750234001004	39	0	39	100.0%
060750234001005	194	3	191	98.5%
060750234001006	22	4	18	81.8%
060750234002000	121	0	121	100.0%
060750234002001	167	4	163	97.6%
060750234002002	135	6	129	95.6%
060750234002003	132	2	130	98.5%
060750234002004	187	1	186	99.5%
060750234002005	205	7	198	96.6%
060750234002006	106	5	101	95.3%
060750234002007	149	11	138	92.6%
060750234002008	198	11	187	94.4%
060750234002009	200	22	178	89.0%
060750234002010	189	7	182	96.3%
060750234002011	141	13	128	90.8%
060750234002012	119	0	119	100.0%
060750234002013	70	3	67	95.7%
060750234002014	58	6	52	89.7%
060750234003001	6	0	6	100.0%
060750234003002	102	14	88	86.3%
060750234003007	22	0	22	100.0%
060750234003008	37	1	36	97.3%
060750234003009	3	0	3	100.0%
060750251001000	60	40	20	33.3%
060750251001001	37	30	7	18.9%
060750251001002	124	41	83	66.9%
060750251001003	215	96	119	55.3%
060750251001004	2	0	2	100.0%
060750251001005	85	22	63	74.1%
060750251001006	93	53	40	43.0%
060750251001007	1	1	0	0.0%
060750251001008	130	85	45	34.6%
060750251001009	42	26	16	38.1%
060750251001010	111	74	37	33.3%
060750251001011	137	51	86	62.8%
060750251001012	69	41	28	40.6%
060750251001013	20	7	13	65.0%
060750251001014	44	32	12	27.3%
060750251001015	31	30	1	3.2%
060750251001016	92	57	35	38.0%
060750251001017	79	49	30	38.0%
060750251001018	49	27	22	44.9%
060750251001019	49	14	35	71.4%
060750251002000	94	56	38	40.4%
060750251002001	35	17	18	51.4%
060750251002002	58	43	15	25.9%
060750251002003	47	29	18	38.3%
060750251002004	83	44	39	47.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750251002005	124	88	36	29.0%
060750251002006	82	30	52	63.4%
060750251002007	165	83	82	49.7%
060750251002008	67	29	38	56.7%
060750251002009	24	7	17	70.8%
060750251002010	36	26	10	27.8%
060750251002011	16	9	7	43.8%
060750251002012	97	50	47	48.5%
060750251002013	11	7	4	36.4%
060750251003001	13	6	7	53.8%
060750251003002	79	49	30	38.0%
060750251003003	4	1	3	75.0%
060750251003006	187	75	112	59.9%
060750251003007	4	2	2	50.0%
060750251003008	99	66	33	33.3%
060750251003009	152	25	127	83.6%
060750251003010	46	19	27	58.7%
060750251003011	64	10	54	84.4%
060750251003012	28	19	9	32.1%
060750251003015	68	24	44	64.7%
060750251003016	40	19	21	52.5%
060750251003017	56	25	31	55.4%
060750252001000	151	39	112	74.2%
060750252001001	271	53	218	80.4%
060750252001002	11	6	5	45.5%
060750252001003	551	130	421	76.4%
060750252001004	422	232	190	45.0%
060750252001005	2	0	2	100.0%
060750252002000	179	92	87	48.6%
060750252002001	246	151	95	38.6%
060750252002002	249	152	97	39.0%
060750252002003	164	98	66	40.2%
060750252002004	144	87	57	39.6%
060750252002005	118	100	18	15.3%
060750252002006	99	72	27	27.3%
060750252002007	47	31	16	34.0%
060750252002008	42	31	11	26.2%
060750252002009	38	25	13	34.2%
060750252002010	59	45	14	23.7%
060750252002011	53	37	16	30.2%
060750252003000	22	17	5	22.7%
060750252003001	11	8	3	27.3%
060750252003002	7	6	1	14.3%
060750252003003	17	10	7	41.2%
060750252003004	25	18	7	28.0%
060750252003005	47	28	19	40.4%
060750252003006	34	18	16	47.1%
060750252003007	77	38	39	50.6%
060750252003008	104	46	58	55.8%
060750252003009	93	37	56	60.2%
060750252003010	96	47	49	51.0%
060750252003011	18	15	3	16.7%
060750252003012	10	6	4	40.0%
060750252003013	10	10	0	0.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
60750252003014	6	5	1	16.7%
60750252003016	106	43	63	59.4%
60750252003017	131	40	91	69.5%
60750252003018	96	56	40	41.7%
60750252003019	81	28	53	65.4%
60750252003020	89	32	57	64.0%
60750252003021	99	47	52	52.5%
60750252003022	122	81	41	33.6%
60750252003023	127	69	58	45.7%
60750252004000	111	83	28	25.2%
060750252004001	232	173	59	25.4%
060750252004002	30	23	7	23.3%
060750252004003	71	42	29	40.8%
060750252004004	89	53	36	40.4%
060750252004005	80	55	25	31.3%
060750252004006	46	31	15	32.6%
060750252004007	77	31	46	59.7%
060750252004008	116	58	58	50.0%
060750252004009	110	40	70	63.6%
060750252004010	114	60	54	47.4%
060750252004011	104	50	54	51.9%
060750253001000	143	102	41	28.7%
060750253001001	166	105	61	36.7%
060750253001002	127	64	63	49.6%
060750253001003	121	65	56	46.3%
060750253001004	35	31	4	11.4%
060750253001005	55	31	24	43.6%
060750253001006	130	82	48	36.9%
060750253001007	117	75	42	35.9%
060750253001008	110	79	31	28.2%
060750253002000	58	51	7	12.1%
060750253002001	68	56	12	17.6%
060750253002002	66	33	33	50.0%
060750253002003	77	52	25	32.5%
060750253002004	39	32	7	17.9%
060750253002005	139	76	63	45.3%
060750253002006	99	50	49	49.5%
060750253002007	92	59	33	35.9%
060750253002008	100	60	40	40.0%
060750253002009	99	70	29	29.3%
060750253003000	253	52	201	79.4%
060750253003001	144	34	110	76.4%
060750253003002	98	55	43	43.9%
060750253003003	113	47	66	58.4%
060750253003004	125	23	102	81.6%
060750253003005	183	23	160	87.4%
060750253003006	187	67	120	64.2%
060750253004000	157	64	93	59.2%
060750253004001	79	28	51	64.6%
060750253004002	408	149	259	63.5%
060750253004003	202	42	160	79.2%
060750253004004	563	167	396	70.3%
060750253004005	127	33	94	74.0%
060750253004006	135	48	87	64.4%
060750254011000	173	88	85	49.1%
060750254011001	240	73	167	69.6%
060750254011002	316	97	219	69.3%
060750254011003	122	73	49	40.2%
060750254011004	342	28	314	91.8%
060750254011005	301	17	284	94.4%
060750254011006	64	18	46	71.9%
060750254011007	72	4	68	94.4%
060750254012000	92	22	70	76.1%
060750254012001	86	35	51	59.3%
060750254012002	73	25	48	65.8%
060750254012003	80	41	39	48.8%
060750254012004	90	47	43	47.8%
060750254012005	82	40	42	51.2%
060750254012006	37	26	11	29.7%
060750254012008	170	94	76	44.7%
060750254012009	263	134	129	49.0%
060750254013000	323	71	252	78.0%
060750254013001	51	1	50	98.0%
060750254013002	112	33	79	70.5%
060750254013003	208	69	139	66.8%
060750254013004	29	3	26	89.7%
060750254013005	312	87	225	72.1%
060750254013006	268	74	194	72.4%
060750254021000	24	4	20	83.3%
060750254021001	2	0	2	100.0%
060750254021002	42	9	33	78.6%
060750254021003	100	34	66	66.0%
060750254021004	85	38	47	55.3%
060750254021005	95	42	53	55.8%
060750254021006	96	22	74	77.1%
060750254021007	113	26	87	77.0%
060750254021008	97	31	66	68.0%
060750254021009	90	44	46	51.1%
060750254021010	111	35	76	68.5%
060750254021011	84	30	54	64.3%
060750254021012	81	17	64	79.0%
060750254021013	97	26	71	73.2%
060750254022000	99	42	57	57.6%
060750254022001	104	25	79	76.0%
060750254022002	42	17	25	59.5%
060750254022003	115	28	87	75.7%
060750254022004	13	6	7	53.8%
060750254022005	95	33	62	65.3%
060750254022006	50	9	41	82.0%
060750254022007	97	31	66	68.0%
060750254022008	118	12	106	89.8%
060750254022009	91	19	72	79.1%
060750254022010	90	14	76	84.4%
060750254022011	109	23	86	78.9%
060750254023000	110	38	72	65.5%
060750254023001	112	50	62	55.4%
060750254023002	108	54	54	50.0%
060750254023003	291	95	196	67.4%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750254023004	200	54	146	73.0%
060750254023005	95	25	70	73.7%
060750254023006	142	10	132	93.0%
060750254023007	43	6	37	86.0%
060750254031000	96	29	67	69.8%
060750254031001	139	49	90	64.7%
060750254031002	305	60	245	80.3%
060750254031003	402	123	279	69.4%
060750254031004	258	83	175	67.8%
060750254031005	60	28	32	53.3%
060750254031006	54	19	35	64.8%
060750254031007	50	33	17	34.0%
060750254031008	53	27	26	49.1%
060750254031009	209	59	150	71.8%
060750254031010	81	24	57	70.4%
060750254031011	70	24	46	65.7%
060750254031012	75	37	38	50.7%
060750254032000	129	2	127	98.4%
060750254032001	974	46	928	95.3%
060750254032002	789	196	593	75.2%
060750254032003	110	28	82	74.5%
060750254032004	337	85	252	74.8%
060750254032005	100	39	61	61.0%
060750254032006	101	27	74	73.3%
060750254032007	95	20	75	78.9%
060750255001000	68	5	63	92.6%
060750255001001	175	59	116	66.3%
060750255001002	93	47	46	49.5%
060750255001003	2	1	1	50.0%
060750255001004	20	7	13	65.0%
060750255001005	348	67	281	80.7%
060750255001006	132	21	111	84.1%
060750255001007	48	28	20	41.7%
060750255001008	19	2	17	89.5%
060750255001009	59	5	54	91.5%
060750255001010	94	33	61	64.9%
060750255001011	107	10	97	90.7%
060750255001012	35	13	22	62.9%
060750255001013	48	8	40	83.3%
060750255002002	29	21	8	27.6%
060750255002003	20	1	19	95.0%
060750255002004	72	16	56	77.8%
060750255002005	18	7	11	61.1%
060750255002006	39	19	20	51.3%
060750255002007	35	12	23	65.7%
060750255002008	96	22	74	77.1%
060750255002009	210	51	159	75.7%
060750255002010	35	13	22	62.9%
060750255002011	159	21	138	86.8%
060750255002012	121	16	105	86.8%
060750255002013	87	22	65	74.7%
060750255002014	209	30	179	85.6%
060750255003000	158	30	128	81.0%
060750255003001	48	20	28	58.3%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750255003002	52	20	32	61.5%
060750255003003	166	33	133	80.1%
060750255003004	175	29	146	83.4%
060750255003005	135	55	80	59.3%
060750255003006	177	33	144	81.4%
060750255004000	170	35	135	79.4%
060750255004001	212	54	158	74.5%
060750255004002	154	20	134	87.0%
060750255004003	153	9	144	94.1%
060750255004004	67	19	48	71.6%
060750255004005	74	24	50	67.6%
060750255004006	17	4	13	76.5%
060750255005000	85	29	56	65.9%
060750255005001	101	28	73	72.3%
060750255005002	102	35	67	65.7%
060750255005003	113	30	83	73.5%
060750255005004	350	47	303	86.6%
060750255005005	154	37	117	76.0%
060750255005006	145	22	123	84.8%
060750255005007	132	27	105	79.5%
060750255005008	128	44	84	65.6%
060750255006002	96	23	73	76.0%
060750255006003	149	45	104	69.8%
060750255006004	265	113	152	57.4%
060750255006005	145	35	110	75.9%
060750255006006	36	0	36	100.0%
060750255006007	30	5	25	83.3%
060750255006008	28	4	24	85.7%
060750255006009	80	15	65	81.3%
060750255006010	139	44	95	68.3%
060750255006011	130	34	96	73.8%
060750255006012	161	47	114	70.8%
060750255006013	133	34	99	74.4%
060750255006014	147	61	86	58.5%
060750255006015	105	31	74	70.5%
060750255006016	223	71	152	68.2%
060750255006017	95	22	73	76.8%
060750255006018	110	38	72	65.5%
060750256001000	330	26	304	92.1%
060750256001001	34	0	34	100.0%
060750256001002	284	45	239	84.2%
060750256001003	168	29	139	82.7%
060750256001004	158	18	140	88.6%
060750256001005	79	8	71	89.9%
060750256001008	5	1	4	80.0%
060750256001009	83	6	77	92.8%
060750256001010	250	47	203	81.2%
060750256001011	358	32	326	91.1%
060750256002000	87	3	84	96.6%
060750256002001	46	5	41	89.1%
060750256002002	82	15	67	81.7%
060750256002004	172	19	153	89.0%
060750256002005	109	31	78	71.6%
060750256002006	122	27	95	77.9%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
0750256002007	125	24	101	80.8%
0750256002008	127	6	121	95.3%
60750256002009	128	12	116	90.6%
60750256002010	126	14	112	88.9%
60750256003000	108	26	82	75.9%
60750256003001	133	29	104	78.2%
60750256003002	108	14	94	87.0%
60750256003003	172	25	147	85.5%
60750256003004	114	36	78	68.4%
60750256003005	153	23	130	85.0%
60750256003006	123	32	91	74.0%
60750256003007	136	35	101	74.3%
60750256003008	100	21	79	79.0%
60750256004000	290	68	222	76.6%
60750256004001	325	61	264	81.2%
60750256004002	177	36	141	79.7%
60750256004003	201	31	170	84.6%
60750256004004	28	2	26	92.9%
60750256004005	241	15	226	93.8%
60750256004006	204	28	176	86.3%
60750256004007	95	26	69	72.6%
60750256004008	78	12	66	84.6%
60750256004009	46	11	35	76.1%
60750257001004	1	0	1	100.0%
60750257001007	51	1	50	98.0%
60750257001008	237	14	223	94.1%
60750257001009	215	8	207	96.3%
60750257001010	97	6	91	93.8%
60750257001011	96	8	88	91.7%
60750257001012	233	15	218	93.6%
60750257001013	238	26	212	89.1%
60750257001014	42	0	42	100.0%
60750257001015	200	20	180	90.0%
60750257001016	155	26	129	83.2%
60750257001017	137	15	122	89.1%
60750257001018	165	36	129	78.2%
60750257001019	141	30	111	78.7%
60750257001020	191	37	154	80.6%
60750257002002	181	25	156	86.2%
60750257002004	117	18	99	84.6%
60750257002005	131	20	111	84.7%
060750257002006	139	18	121	87.1%
060750257002007	127	0	127	100.0%
060750257002008	182	16	166	91.2%
060750257002009	232	14	218	94.0%
060750257002010	134	22	112	83.6%
060750257002011	187	17	170	90.9%
060750257002012	202	27	175	86.6%
060750257002013	156	22	134	85.9%
060750257003001	195	14	181	92.8%
060750257003002	89	14	75	84.3%
060750257003003	178	17	161	90.4%
060750257003004	190	38	152	80.0%
060750257003005	196	19	177	90.3%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750257003006	138	18	120	87.0%
060750257003007	171	27	144	84.2%
060750257003008	152	37	115	75.7%
060750257004000	138	50	88	63.8%
060750257004001	158	40	118	74.7%
060750257004002	126	31	95	75.4%
060750257004003	83	29	54	65.1%
060750257004004	163	31	132	81.0%
060750257004006	85	14	71	83.5%
060750257004007	68	9	59	86.8%
060750257004008	109	17	92	84.4%
060750257004009	83	44	39	47.0%
060750257004010	96	30	66	68.8%
060750257004011	158	31	127	80.4%
060750257005000	62	12	50	80.6%
060750257005001	130	24	106	81.5%
060750257005002	80	29	51	63.8%
060750257005003	104	20	84	80.8%
060750257005004	95	12	83	87.4%
060750257005005	56	28	28	50.0%
060750257005006	64	14	50	78.1%
060750257005007	207	21	186	89.9%
060750257005008	136	33	103	75.7%
060750257005009	137	39	98	71.5%
060750257005010	115	31	84	73.0%
060750257005012	201	19	182	90.5%
060750257006000	560	72	488	87.1%
060750257006002	95	26	69	72.6%
060750257006003	81	19	62	76.5%
060750257006004	112	29	83	74.1%
060750257006005	99	34	65	65.7%
060750257006006	88	28	60	68.2%
060750257006007	236	47	189	80.1%
060750258001000	145	33	112	77.2%
060750258001001	142	18	124	87.3%
060750258001002	115	27	88	76.5%
060750258001003	115	19	96	83.5%
060750258001004	133	16	117	88.0%
060750258001005	224	18	206	92.0%
060750258001006	112	10	102	91.1%
060750258001007	129	15	114	88.4%
060750258002001	67	1	66	98.5%
060750258002002	222	11	211	95.0%
060750258002003	94	13	81	86.2%
060750258002004	76	13	63	82.9%
060750258002005	109	17	92	84.4%
060750258002006	188	17	171	91.0%
060750259001000	129	39	90	69.8%
060750259001001	233	12	221	94.8%
060750259001002	140	65	75	53.6%
060750259001003	317	77	240	75.7%
060750259001004	157	70	87	55.4%
060750259001005	104	48	56	53.8%
060750259001006	109	43	66	60.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750259001007	303	40	263	86.8%
060750259001008	81	34	47	58.0%
060750259001009	72	10	62	86.1%
060750259001010	109	33	76	69.7%
060750259001011	131	39	92	70.2%
060750259001012	105	41	64	61.0%
060750259002000	167	18	149	89.2%
060750259002001	48	9	39	81.3%
060750259002002	83	23	60	72.3%
060750259002003	132	23	109	82.6%
060750259002004	107	24	83	77.6%
060750259002005	126	19	107	84.9%
060750259002006	134	30	104	77.6%
060750259002007	235	49	186	79.1%
060750259002008	116	31	85	73.3%
060750259002009	278	22	256	92.1%
060750259002010	106	16	90	84.9%
060750259002011	114	20	94	82.5%
060750259002012	99	16	83	83.8%
060750259003000	77	14	63	81.8%
060750259003001	143	18	125	87.4%
060750259003002	107	16	91	85.0%
060750259003003	25	1	24	96.0%
060750259003004	95	6	89	93.7%
060750259003005	96	17	79	82.3%
060750260011000	209	14	195	93.3%
060750260011001	218	46	172	78.9%
060750260011002	208	10	198	95.2%
060750260011003	64	15	49	76.6%
060750260011004	204	34	170	83.3%
060750260011005	72	21	51	70.8%
060750260011006	177	26	151	85.3%
060750260011007	248	28	220	88.7%
060750260011008	274	24	250	91.2%
060750260011009	287	36	251	87.5%
060750260011010	233	38	195	83.7%
060750260011011	244	28	216	88.5%
060750260011012	308	37	271	88.0%
060750260012000	216	40	176	81.5%
060750260012001	204	32	172	84.3%
060750260012002	302	30	272	90.1%
060750260012003	229	28	201	87.8%
060750260012004	224	32	192	85.7%
060750260012005	196	25	171	87.2%
060750260012006	241	31	210	87.1%
060750260012007	336	34	302	89.9%
060750260012008	232	32	200	86.2%
060750260012009	268	49	219	81.7%
060750260012010	102	24	78	76.5%
060750260012011	253	41	212	83.8%
060750260021000	219	32	187	85.4%
060750260021001	219	29	190	86.8%
060750260021002	115	18	97	84.3%
060750260021003	46	7	39	84.8%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750260021004	417	417	0	0.0%
060750260021005	221	36	185	83.7%
060750260021006	211	53	158	74.9%
060750260021007	202	33	169	83.7%
060750260021008	165	42	123	74.5%
060750260022000	234	44	190	81.2%
060750260022001	214	37	177	82.7%
060750260022002	33	7	26	78.8%
060750260022003	162	39	123	75.9%
060750260022004	367	68	299	81.5%
060750260022005	187	50	137	73.3%
060750260022006	188	38	150	79.8%
060750260022007	175	53	122	69.7%
060750260022008	85	30	55	64.7%
060750260022009	127	28	99	78.0%
060750260022011	93	18	75	80.6%
060750260031000	78	21	57	73.1%
060750260031001	181	23	158	87.3%
060750260031002	191	44	147	77.0%
060750260031003	207	14	193	93.2%
060750260031004	203	24	179	88.2%
060750260031005	221	37	184	83.3%
060750260031006	232	42	190	81.9%
060750260031007	202	27	175	86.6%
060750260031008	100	23	77	77.0%
060750260031009	220	30	190	86.4%
060750260031010	191	47	144	75.4%
060750260031011	160	18	142	88.8%
060750260032000	86	32	54	62.8%
060750260032001	166	60	106	63.9%
060750260032002	219	26	193	88.1%
060750260032003	214	39	175	81.8%
060750260032004	224	32	192	85.7%
060750260032005	224	33	191	85.3%
060750260032006	203	40	163	80.3%
060750260032007	227	40	187	82.4%
060750260032008	199	38	161	80.9%
060750260032009	209	35	174	83.3%
060750260032010	247	25	222	89.9%
060750260032011	205	37	168	82.0%
060750260032012	125	31	94	75.2%
060750260032013	92	28	64	69.6%
060750260041000	215	53	162	75.3%
060750260041001	230	30	200	87.0%
060750260041002	228	33	195	85.5%
060750260041003	128	15	113	88.3%
060750260041004	106	13	93	87.7%
060750260041005	176	39	137	77.8%
060750260041006	197	30	167	84.8%
060750260041007	228	39	189	82.9%
060750260041008	132	31	101	76.5%
060750260041009	129	21	108	83.7%
060750260041010	153	15	138	90.2%
060750260041011	127	7	120	94.5%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
60750260041012	127	16	111	87.4%
60750260042000	193	49	144	74.6%
60750260042001	170	49	121	71.2%
60750260042002	215	39	176	81.9%
60750260042003	215	29	186	86.5%
60750260042004	284	47	237	83.5%
60750260042005	226	25	201	88.9%
60750260042006	192	35	157	81.8%
60750260042007	69	15	54	78.3%
60750260042008	67	13	54	80.6%
60750260042009	2	0	2	100.0%
60750260042010	88	13	75	85.2%
60750260042011	113	14	99	87.6%
60750261001003	82	17	65	79.3%
60750261001004	104	22	82	78.8%
60750261001005	313	16	297	94.9%
60750261001006	384	45	339	88.3%
60750261001007	205	33	172	83.9%
60750261001008	73	14	59	80.8%
60750261001009	39	9	30	76.9%
60750261001010	240	36	204	85.0%
60750261002000	176	33	143	81.3%
60750261002001	106	16	90	84.9%
60750261002002	158	14	144	91.1%
60750261002003	217	44	173	79.7%
60750261002004	243	26	217	89.3%
60750261002005	91	31	60	65.9%
60750261002006	119	17	102	85.7%
60750261002007	132	22	110	83.3%
60750261002008	9	0	9	100.0%
60750261002009	195	14	181	92.8%
60750261002010	422	55	367	87.0%
60750261002011	414	17	397	95.9%
60750261002012	151	14	137	90.7%
60750261003000	175	17	158	90.3%
60750261003001	100	19	81	81.0%
60750261003002	113	22	91	80.5%
60750261003003	44	11	33	75.0%
60750261003004	53	5	48	90.6%
60750261003005	102	28	74	72.5%
60750261003006	64	17	47	73.4%
60750261003007	72	29	43	59.7%
60750261003008	124	26	98	79.0%
60750261003009	39	15	24	61.5%
60750261003010	87	21	66	75.9%
60750261003011	35	9	26	74.3%
60750261004000	204	21	183	89.7%
60750261004001	76	20	56	73.7%
60750261004002	34	17	17	50.0%
60750261004003	267	57	210	78.7%
60750261004006	59	8	51	86.4%
060750261004007	158	32	126	79.7%
060750261004008	151	27	124	82.1%
060750261004009	165	29	136	82.4%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750262001000	95	3	92	96.8%
060750262001001	165	29	136	82.4%
060750262001002	25	9	16	64.0%
060750262001003	93	25	68	73.1%
060750262001004	57	20	37	64.9%
060750262001005	88	19	69	78.4%
060750262001006	54	11	43	79.6%
060750262001007	165	20	145	87.9%
060750262001008	45	8	37	82.2%
060750262001009	44	15	29	65.9%
060750262001010	25	1	24	96.0%
060750262001012	149	27	122	81.9%
060750262001013	309	66	243	78.6%
060750262001014	167	20	147	88.0%
060750262001015	289	19	270	93.4%
060750262002000	105	11	94	89.5%
060750262002001	144	17	127	88.2%
060750262002002	183	17	166	90.7%
060750262002003	233	33	200	85.8%
060750262002004	96	11	85	88.5%
060750262002005	65	11	54	83.1%
060750262002006	109	31	78	71.6%
060750262002007	137	29	108	78.8%
060750262002008	166	22	144	86.7%
060750262002009	48	2	46	95.8%
060750262003000	171	15	156	91.2%
060750262003001	127	14	113	89.0%
060750262003003	63	0	63	100.0%
060750262003004	212	9	203	95.8%
060750262003005	40	1	39	97.5%
060750262003006	229	13	216	94.3%
060750262003007	147	19	128	87.1%
060750262003008	132	15	117	88.6%
060750262003009	185	27	158	85.4%
060750262004000	1	0	1	100.0%
060750262004001	716	57	659	92.0%
060750262004003	182	10	172	94.5%
060750262004004	239	10	229	95.8%
060750262004005	63	3	60	95.2%
060750262004006	109	4	105	96.3%
060750262004008	183	26	157	85.8%
060750262004009	71	0	71	100.0%
060750262005000	145	15	130	89.7%
060750262005001	31	2	29	93.5%
060750262005002	114	14	100	87.7%
060750262005003	55	4	51	92.7%
060750262005006	189	28	161	85.2%
060750262005007	116	10	106	91.4%
060750262005008	175	28	147	84.0%
060750262005009	103	23	80	77.7%
060750262005010	113	9	104	92.0%
060750262005011	25	0	25	100.0%
060750263011000	182	21	161	88.5%
060750263011001	137	29	108	78.8%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750263011002	166	27	139	83.7%
060750263011003	118	11	107	90.7%
060750263011004	126	23	103	81.7%
060750263011005	114	15	99	86.8%
060750263011006	114	12	102	89.5%
060750263011007	106	8	98	92.5%
060750263011008	93	13	80	86.0%
060750263012000	139	23	116	83.5%
060750263012001	186	15	171	91.9%
060750263012002	103	4	99	96.1%
060750263012003	372	57	315	84.7%
060750263012004	207	19	188	90.8%
060750263012005	74	3	71	95.9%
060750263012006	168	14	154	91.7%
060750263012007	239	8	231	96.7%
060750263012008	201	15	186	92.5%
060750263012009	200	14	186	93.0%
060750263012010	262	28	234	89.3%
060750263012011	129	28	101	78.3%
060750263013000	184	23	161	87.5%
060750263013001	124	28	96	77.4%
060750263013002	150	31	119	79.3%
060750263013003	114	21	93	81.6%
060750263013004	161	31	130	80.7%
060750263013005	105	22	83	79.0%
060750263013006	136	9	127	93.4%
060750263021000	170	15	155	91.2%
060750263021001	130	16	114	87.7%
060750263021002	148	41	107	72.3%
060750263021003	65	17	48	73.8%
060750263021004	114	7	107	93.9%
060750263021005	172	26	146	84.9%
060750263021006	166	51	115	69.3%
060750263021007	119	39	80	67.2%
060750263022000	9	2	7	77.8%
060750263022001	50	10	40	80.0%
060750263022002	95	28	67	70.5%
060750263022003	88	13	75	85.2%
060750263022004	92	16	76	82.6%
060750263022005	112	25	87	77.7%
060750263022006	150	38	112	74.7%
060750263022007	117	24	93	79.5%
060750263022009	94	13	81	86.2%
060750263022010	129	7	122	94.6%
060750263022011	103	27	76	73.8%
060750263022012	111	30	81	73.0%
060750263023001	31	11	20	64.5%
060750263023002	303	26	277	91.4%
060750263023003	1076	198	878	81.6%
060750263023004	41	8	33	80.5%
060750263023005	35	2	33	94.3%
060750263023007	58	7	51	87.9%
060750263023008	74	32	42	56.8%
060750263023009	150	46	104	69.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750263023010	121	21	100	82.6%
060750263023011	18	2	16	88.9%
060750263023012	117	36	81	69.2%
060750263023013	79	37	42	53.2%
060750263023014	18	12	6	33.3%
060750263031000	74	23	51	68.9%
060750263031001	160	29	131	81.9%
060750263031002	184	23	161	87.5%
060750263031003	130	21	109	83.8%
060750263031004	112	12	100	89.3%
060750263031005	443	44	399	90.1%
060750263031006	294	28	266	90.5%
060750263031007	380	24	356	93.7%
060750263031008	16	3	13	81.3%
060750263031009	151	6	145	96.0%
060750263031010	509	47	462	90.8%
060750263031011	277	12	265	95.7%
060750263031012	38	0	38	100.0%
060750263031013	2	0	2	100.0%
060750263031014	122	11	111	91.0%
060750263031015	343	55	288	84.0%
060750263031017	209	26	183	87.6%
060750263031018	334	80	254	76.0%
060750263031019	106	8	98	92.5%
060750263031020	56	3	53	94.6%
060750263031021	183	37	146	79.8%
060750263031022	252	73	179	71.0%
060750263031023	84	38	46	54.8%
060750263031024	70	13	57	81.4%
060750264011000	106	9	97	91.5%
060750264011001	155	11	144	92.9%
060750264011002	240	7	233	97.1%
060750264011003	136	12	124	91.2%
060750264011004	60	9	51	85.0%
060750264011005	134	6	128	95.5%
060750264011006	168	5	163	97.0%
060750264011007	136	4	132	97.1%
060750264011008	397	18	379	95.5%
060750264011009	214	6	208	97.2%
060750264011010	184	11	173	94.0%
060750264012000	198	18	180	90.9%
060750264012001	170	16	154	90.6%
060750264012002	205	7	198	96.6%
060750264012003	193	16	177	91.7%
060750264012004	191	15	176	92.1%
060750264012005	180	19	161	89.4%
060750264012006	270	19	251	93.0%
060750264012007	227	10	217	95.6%
060750264012008	18	2	16	88.9%
060750264012009	151	7	144	95.4%
060750264021000	71	4	67	94.4%
060750264021001	102	17	85	83.3%
060750264021002	135	12	123	91.1%
060750264021003	164	18	146	89.0%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750264021004	150	12	138	92.0%
060750264021005	133	15	118	88.7%
060750264021006	214	21	193	90.2%
060750264022002	164	21	143	87.2%
060750264022003	153	19	134	87.6%
060750264022004	130	9	121	93.1%
060750264022005	159	9	150	94.3%
060750264022006	127	10	117	92.1%
060750264022007	82	7	75	91.5%
060750264022008	8	0	8	100.0%
060750264022009	115	25	90	78.3%
060750264022010	136	23	113	83.1%
060750264022011	114	17	97	85.1%
060750264022012	100	11	89	89.0%
060750264022013	173	20	153	88.4%
060750264022014	88	5	83	94.3%
060750264022015	32	3	29	90.6%
060750264023000	376	32	344	91.5%
060750264023001	229	51	178	77.7%
060750264023002	200	28	172	86.0%
060750264023003	109	4	105	96.3%
060750264023004	160	18	142	88.8%
060750264023005	239	45	194	81.2%
060750264023006	157	25	132	84.1%
060750264023007	89	4	85	95.5%
060750264031000	66	14	52	78.8%
060750264031001	170	16	154	90.6%
060750264031002	189	24	165	87.3%
060750264031003	201	20	181	90.0%
060750264031004	218	11	207	95.0%
060750264031005	232	19	213	91.8%
060750264031006	200	16	184	92.0%
060750264031007	427	19	408	95.6%
060750264031008	226	18	208	92.0%
060750264031009	112	9	103	92.0%
060750264031010	57	0	57	100.0%
060750264032000	245	10	235	95.9%
060750264032001	141	12	129	91.5%
060750264032002	200	19	181	90.5%
060750264032003	146	21	125	85.6%
060750264032004	164	12	152	92.7%
060750264032005	110	5	105	95.5%
060750264032006	313	49	264	84.3%
060750264032007	131	7	124	94.7%
060750264032008	134	3	131	97.8%
060750264032009	158	12	146	92.4%
060750264032010	272	18	254	93.4%
060750264041000	395	19	376	95.2%
060750264041001	240	2	238	99.2%
060750264041002	149	6	143	96.0%
060750264041003	260	6	254	97.7%
060750264041004	206	6	200	97.1%
060750264041005	168	10	158	94.0%
060750264041006	156	10	146	93.6%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750264042001	384	22	362	94.3%
060750264042002	95	1	94	98.9%
060750264042003	138	7	131	94.9%
060750264042004	47	0	47	100.0%
060750264042005	26	0	26	100.0%
060750264042006	23	2	21	91.3%
060750301011000	307	234	73	23.8%
060750301011001	580	252	328	56.6%
060750301011002	238	179	59	24.8%
060750301011003	265	209	56	21.1%
060750301012000	161	116	45	28.0%
060750301012001	174	110	64	36.8%
060750301012002	187	136	51	27.3%
060750301012003	172	106	66	38.4%
060750301012004	189	126	63	33.3%
060750301012005	124	92	32	25.8%
060750301012006	113	11	102	90.3%
060750301012007	192	121	71	37.0%
060750301013000	129	85	44	34.1%
060750301013001	162	109	53	32.7%
060750301013002	200	123	77	38.5%
060750301013003	132	90	42	31.8%
060750301013004	151	101	50	33.1%
060750301013005	116	87	29	25.0%
060750301014000	231	177	54	23.4%
060750301014001	238	159	79	33.2%
060750301014002	121	61	60	49.6%
060750301014003	226	138	88	38.9%
060750301014004	67	45	22	32.8%
060750301021000	1956	1230	726	37.1%
060750301021001	73	21	52	71.2%
060750301021002	191	159	32	16.8%
060750301021003	67	65	2	3.0%
060750301021004	92	24	68	73.9%
060750301021005	207	142	65	31.4%
060750301022000	50	35	15	30.0%
060750301022001	139	79	60	43.2%
060750301022002	28	19	9	32.1%
060750301022003	20	9	11	55.0%
060750301022004	82	46	36	43.9%
060750301022005	51	28	23	45.1%
060750301022006	674	422	252	37.4%
060750301022007	81	31	50	61.7%
060750301022009	42	22	20	47.6%
060750301022010	21	11	10	47.6%
060750301022011	38	27	11	28.9%
060750301022012	96	55	41	42.7%
060750301023000	85	70	15	17.6%
060750301023001	83	69	14	16.9%
060750301023002	120	98	22	18.3%
060750301023003	196	156	40	20.4%
060750301023004	197	168	29	14.7%
060750301023005	62	46	16	25.8%
060750301023006	32	30	2	6.3%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750301023007	67	52	15	22.4%
060750301023008	26	20	6	23.1%
060750301023009	21	21	0	0.0%
060750302011000	277	225	52	18.8%
060750302011001	380	258	122	32.1%
060750302011002	166	102	64	38.6%
060750302011003	352	210	142	40.3%
060750302011004	338	210	128	37.9%
060750302011005	248	117	131	52.8%
060750302012000	19	9	10	52.6%
060750302012001	203	69	134	66.0%
060750302012002	237	124	113	47.7%
060750302012003	254	148	106	41.7%
060750302012004	195	83	112	57.4%
060750302012005	118	56	62	52.5%
060750302013000	206	104	102	49.5%
060750302013001	217	103	114	52.5%
060750302013002	150	102	48	32.0%
060750302013003	206	136	70	34.0%
060750302013004	217	116	101	46.5%
060750302013005	197	72	125	63.5%
060750302021000	221	132	89	40.3%
060750302021001	220	141	79	35.9%
060750302021002	211	131	80	37.9%
060750302021003	288	173	115	39.9%
060750302021004	348	195	153	44.0%
060750302021005	254	151	103	40.6%
060750302022000	269	160	109	40.5%
060750302022001	210	131	79	37.6%
060750302022002	217	139	78	35.9%
060750302022003	323	182	141	43.7%
060750302022004	247	122	125	50.6%
060750302022005	237	120	117	49.4%
060750302023000	284	167	117	41.2%
060750302023001	254	140	114	44.9%
060750302023002	182	96	86	47.3%
060750302023003	259	126	133	51.4%
060750302023004	233	140	93	39.9%
060750302023005	197	119	78	39.6%
060750303011000	136	77	59	43.4%
060750303011001	66	41	25	37.9%
060750303011002	161	55	106	65.8%
060750303011003	24	19	5	20.8%
060750303011004	138	42	96	69.6%
060750303011005	169	63	106	62.7%
060750303011006	175	55	120	68.6%
060750303011007	170	60	110	64.7%
060750303011008	130	72	58	44.6%
060750303011009	117	53	64	54.7%
060750303012000	228	132	96	42.1%
060750303012001	270	132	138	51.1%
060750303012002	273	168	105	38.5%
060750303012003	213	126	87	40.8%
060750303012004	205	100	105	51.2%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750303012005	160	81	79	49.4%
060750303012006	190	117	73	38.4%
060750303012007	204	120	84	41.2%
060750303012008	49	35	14	28.6%
060750303012009	42	36	6	14.3%
060750303012010	140	69	71	50.7%
060750303013000	155	90	65	41.9%
060750303013001	200	88	112	56.0%
060750303013002	177	118	59	33.3%
060750303013003	135	87	48	35.6%
060750303013004	128	78	50	39.1%
060750303013005	96	28	68	70.8%
060750303013006	157	90	67	42.7%
060750303013007	175	110	65	37.1%
060750303013008	220	122	98	44.5%
060750303013009	48	21	27	56.3%
060750303014000	213	127	86	40.4%
060750303014001	96	41	55	57.3%
060750303014002	78	22	56	71.8%
060750303014003	115	45	70	60.9%
060750303014004	98	36	62	63.3%
060750303014005	106	49	57	53.8%
060750303014006	35	13	22	62.9%
060750303014007	53	21	32	60.4%
060750303014008	74	30	44	59.5%
060750303014009	76	50	26	34.2%
060750303014010	57	27	30	52.6%
060750303014011	78	37	41	52.6%
060750303014012	56	33	23	41.1%
060750303021000	67	20	47	70.1%
060750303021001	74	25	49	66.2%
060750303021002	106	45	61	57.5%
060750303021003	125	66	59	47.2%
060750303021004	223	89	134	60.1%
060750303021005	182	47	135	74.2%
060750303021006	140	46	94	67.1%
060750303021007	128	55	73	57.0%
060750303021008	149	84	65	43.6%
060750303021009	76	39	37	48.7%
060750303022000	75	52	23	30.7%
060750303022002	142	94	48	33.8%
060750303022003	101	70	31	30.7%
060750303022004	74	44	30	40.5%
060750303022005	74	31	43	58.1%
060750303022006	115	71	44	38.3%
060750303022007	69	51	18	26.1%
060750303022008	123	83	40	32.5%
060750303022009	100	55	45	45.0%
060750303022011	130	41	89	68.5%
060750303023000	46	26	20	43.5%
060750303023001	49	28	21	42.9%
060750303023002	94	62	32	34.0%
060750303023003	93	61	32	34.4%
060750303023004	58	33	25	43.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750303023005	66	21	45	68.2%
060750303023006	169	39	130	76.9%
060750303023007	218	50	168	77.1%
060750303023008	122	72	50	41.0%
060750303023009	111	57	54	48.6%
060750303023010	101	53	48	47.5%
060750303023011	52	22	30	57.7%
060750303023012	19	12	7	36.8%
060750304001000	113	67	46	40.7%
060750304001001	99	77	22	22.2%
060750304001002	93	67	26	28.0%
060750304001003	57	49	8	14.0%
060750304001004	41	30	11	26.8%
060750304001005	146	82	64	43.8%
060750304001006	56	42	14	25.0%
060750304001007	36	27	9	25.0%
060750304001008	35	21	14	40.0%
060750304001009	54	45	9	16.7%
060750304001010	63	44	19	30.2%
060750304001011	73	42	31	42.5%
060750304001012	31	23	8	25.8%
060750304001013	61	50	11	18.0%
060750304001014	80	54	26	32.5%
060750304002000	112	86	26	23.2%
060750304002001	26	18	8	30.8%
060750304002002	69	58	11	15.9%
060750304002003	68	52	16	23.5%
060750304002004	55	32	23	41.8%
060750304002005	109	72	37	33.9%
060750304002006	540	368	172	31.9%
060750304002007	81	37	44	54.3%
060750304003000	161	101	60	37.3%
060750304003001	243	137	106	43.6%
060750304003002	134	54	80	59.7%
060750304003003	175	25	150	85.7%
060750304003004	108	50	58	53.7%
060750304003005	127	73	54	42.5%
060750304003006	147	63	84	57.1%
060750304003007	149	64	85	57.0%
060750304003008	170	38	132	77.6%
060750304004000	126	67	59	46.8%
060750304004001	94	53	41	43.6%
060750304004002	114	44	70	61.4%
060750304004003	147	59	88	59.9%
060750304004004	144	69	75	52.1%
060750304004005	177	48	129	72.9%
060750304005000	152	105	47	30.9%
060750304005001	163	87	76	46.6%
060750304005002	51	17	34	66.7%
060750304005003	160	66	94	58.8%
060750304005004	131	75	56	42.7%
060750304005005	206	64	142	68.9%
060750305001000	285	171	114	40.0%
060750305001002	427	287	140	32.8%
060750305001003	24	22	2	8.3%
060750305001004	109	67	42	38.5%
060750305002000	65	29	36	55.4%
060750305002001	122	55	67	54.9%
060750305002002	131	83	48	36.6%
060750305002003	91	67	24	26.4%
060750305002004	94	57	37	39.4%
060750305002005	57	28	29	50.9%
060750305002006	210	140	70	33.3%
060750305003000	104	80	24	23.1%
060750305003001	1551	690	861	55.5%
060750305003002	104	58	46	44.2%
060750306001000	36	17	19	52.8%
060750306001001	77	59	18	23.4%
060750306001002	108	72	36	33.3%
060750306001003	76	58	18	23.7%
060750306001004	57	40	17	29.8%
060750306001005	29	14	15	51.7%
060750306001006	71	43	28	39.4%
060750306001007	52	29	23	44.2%
060750306001008	14	11	3	21.4%
060750306001009	57	43	14	24.6%
060750306001010	63	37	26	41.3%
060750306001011	87	61	26	29.9%
060750306002000	73	47	26	35.6%
060750306002001	56	32	24	42.9%
060750306002002	16	12	4	25.0%
060750306002003	101	56	45	44.6%
060750306002004	25	17	8	32.0%
060750306002005	71	41	30	42.3%
060750306002006	108	71	37	34.3%
060750306002007	82	43	39	47.6%
060750306002008	73	59	14	19.2%
060750306002009	35	24	11	31.4%
060750306003000	95	71	24	25.3%
060750306003001	27	19	8	29.6%
060750306003002	32	8	24	75.0%
060750306003003	14	12	2	14.3%
060750306003004	8	8	0	0.0%
060750306003005	73	31	42	57.5%
060750306003006	25	22	3	12.0%
060750306003007	26	17	9	34.6%
060750306003008	389	273	116	29.8%
060750306003009	20	18	2	10.0%
060750306003010	56	42	14	25.0%
060750307001000	484	270	214	44.2%
060750307001001	98	59	39	39.8%
060750307001002	240	132	108	45.0%
060750307001003	139	99	40	28.8%
060750307001004	102	60	42	41.2%
060750307001005	112	82	30	26.8%
060750307001006	103	65	38	36.9%
060750307001007	42	33	9	21.4%
060750307001008	61	30	31	50.8%

Block Group	Popu- lation	Non Hispanic White	Minority	Percent Minority
060750307001009	65	45	20	30.8%
060750307001010	114	79	35	30.7%
060750307001011	90	59	31	34.4%
060750307001012	80	45	35	43.8%
060750307001013	24	16	8	33.3%
060750307001015	48	25	23	47.9%
060750307001016	556	361	195	35.1%
060750307001017	129	70	59	45.7%
060750307001018	144	99	45	31.3%
060750307002000	118	83	35	29.7%
060750307002001	137	86	51	37.2%
060750307002002	63	49	14	22.2%
060750307002003	73	49	24	32.9%
060750307002004	85	52	33	38.8%
060750307002005	100	64	36	36.0%
060750307002006	42	33	9	21.4%
060750307002007	157	91	66	42.0%
060750307002008	145	73	72	49.7%
060750307002009	77	23	54	70.1%
060750307002010	1	1	0	0.0%
060750307002011	175	97	78	44.6%
060750307002012	60	35	25	41.7%
060750307002013	122	59	63	51.6%
060750307002014	111	54	57	51.4%
060750307002015	129	65	64	49.6%
060750307003000	95	58	37	38.9%
060750307003001	91	53	38	41.8%
060750307003002	82	52	30	36.6%
060750307003003	43	24	19	44.2%
060750307003004	148	91	57	38.5%
060750307003005	235	148	87	37.0%
060750307003006	59	42	17	28.8%
060750307003007	124	74	50	40.3%
060750307003008	137	73	64	46.7%
060750307003009	68	32	36	52.9%
060750307003010	82	31	51	62.2%
060750307003011	71	47	24	33.8%
060750307003012	145	84	61	42.1%
060750307003013	29	13	16	55.2%
060750307003014	88	50	38	43.2%
060750307003015	66	32	34	51.5%
060750307003016	83	49	34	41.0%
060750307003017	51	25	26	51.0%
060750307003018	185	74	111	60.0%
060750307003019	94	63	31	33.0%
060750307003020	165	98	67	40.6%
060750308001000	24	12	12	50.0%
060750308001001	195	117	78	40.0%
060750308001003	127	68	59	46.5%
060750308001004	36	15	21	58.3%
060750308001005	94	75	19	20.2%
060750308001006	148	106	42	28.4%
060750308001007	41	22	19	46.3%
060750308001008	74	57	17	23.0%

Block Group	Popu- lation	Non Hispanic White	Minority	Percent Minority
060750308001009	57	40	17	29.8%
060750308001010	61	38	23	37.7%
060750308002000	50	34	16	32.0%
060750308002001	154	105	49	31.8%
060750308002002	37	28	9	24.3%
060750308002003	62	36	26	41.9%
060750308002004	72	47	25	34.7%
060750308002005	35	13	22	62.9%
060750308002006	58	38	20	34.5%
060750308002007	77	65	12	15.6%
060750308002008	79	55	24	30.4%
060750308002009	27	17	10	37.0%
060750308002010	75	50	25	33.3%
060750308003000	42	35	7	16.7%
060750308003001	55	43	12	21.8%
060750308003002	62	38	24	38.7%
060750308003003	79	57	22	27.8%
060750308003004	48	22	26	54.2%
060750308003005	56	39	17	30.4%
060750308003006	57	32	25	43.9%
060750308003007	40	23	17	42.5%
060750308003008	43	30	13	30.2%
060750308003009	17	16	1	5.9%
060750308003010	55	44	11	20.0%
060750308003011	72	38	34	47.2%
060750308003012	50	33	17	34.0%
060750308003013	14	14	0	0.0%
060750308003014	28	12	16	57.1%
060750308004000	47	39	8	17.0%
060750308004001	55	43	12	21.8%
060750308004002	75	44	31	41.3%
060750308004003	113	80	33	29.2%
060750308004004	148	85	63	42.6%
060750308004005	103	78	25	24.3%
060750308004006	81	58	23	28.4%
060750308004007	85	50	35	41.2%
060750308004008	107	84	23	21.5%
060750308004009	333	213	120	36.0%
060750308004010	99	61	38	38.4%
060750308004011	131	88	43	32.8%
060750308004012	129	91	38	29.5%
060750308004013	130	100	30	23.1%
060750308005000	134	69	65	48.5%
060750308005001	98	47	51	52.0%
060750308005002	105	52	53	50.5%
060750308005003	102	57	45	44.1%
060750308005004	131	66	65	49.6%
060750308005005	163	94	69	42.3%
060750308005006	153	74	79	51.6%
060750308005007	170	57	113	66.5%
060750308005008	182	51	131	72.0%
060750308005009	141	73	68	48.2%
060750308005010	47	26	21	44.7%
060750308005011	153	73	80	52.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750308005012	130	69	61	46.9%
060750309001000	96	62	34	35.4%
060750309001001	63	49	14	22.2%
060750309001002	92	65	27	29.3%
060750309001003	52	34	18	34.6%
060750309001004	263	173	90	34.2%
060750309001005	33	20	13	39.4%
060750309001006	116	77	39	33.6%
060750309001007	82	57	25	30.5%
060750309001008	26	23	3	11.5%
060750309001009	44	34	10	22.7%
060750309001010	38	22	16	42.1%
060750309002000	116	63	53	45.7%
060750309002001	28	14	14	50.0%
060750309002002	69	40	29	42.0%
060750309002003	46	28	18	39.1%
060750309002004	94	54	40	42.6%
060750309002005	74	47	27	36.5%
060750309002006	68	34	34	50.0%
060750309002007	56	29	27	48.2%
060750309002008	107	68	39	36.4%
060750309002009	40	23	17	42.5%
060750309002010	66	49	17	25.8%
060750309002011	66	42	24	36.4%
060750309002012	98	64	34	34.7%
060750309002013	64	36	28	43.8%
060750309002014	132	45	87	65.9%
060750309002015	82	30	52	63.4%
060750309002016	144	64	80	55.6%
060750309002017	46	23	23	50.0%
060750309003000	56	24	32	57.1%
060750309003001	182	66	116	63.7%
060750309003002	161	85	76	47.2%
060750309003004	21	13	8	38.1%
060750309003005	72	40	32	44.4%
060750309003006	82	45	37	45.1%
060750309003007	82	41	41	50.0%
060750309003008	64	33	31	48.4%
060750309003009	14	9	5	35.7%
060750309003010	137	60	77	56.2%
060750309003011	77	31	46	59.7%
060750309003012	74	56	18	24.3%
060750309003013	74	25	49	66.2%
060750309003014	70	28	42	60.0%
060750309003015	87	31	56	64.4%
060750309004000	102	47	55	53.9%
060750309004001	52	33	19	36.5%
060750309004002	73	39	34	46.6%
060750309004003	88	59	29	33.0%
060750309004004	69	63	6	8.7%
060750309004005	32	31	1	3.1%
060750309004006	53	27	26	49.1%
060750309004007	46	29	17	37.0%
060750309004008	217	133	84	38.7%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750309004009	81	32	49	60.5%
060750309004010	45	20	25	55.6%
060750309004011	50	28	22	44.0%
060750309005000	60	41	19	31.7%
060750309005001	38	29	9	23.7%
060750309005002	42	33	9	21.4%
060750309005003	48	37	11	22.9%
060750309005004	53	33	20	37.7%
060750309005005	40	19	21	52.5%
060750309005006	17	13	4	23.5%
060750309005007	55	24	31	56.4%
060750309005008	59	33	26	44.1%
060750309005009	48	27	21	43.8%
060750309005010	60	36	24	40.0%
060750309005011	110	54	56	50.9%
060750309005012	82	58	24	29.3%
060750309005013	55	26	29	52.7%
060750309006000	47	24	23	48.9%
060750309006001	26	19	7	26.9%
060750309006002	57	37	20	35.1%
060750309006003	93	43	50	53.8%
060750309006004	33	18	15	45.5%
060750309006005	66	55	11	16.7%
060750309006006	95	48	47	49.5%
060750309006007	10	4	6	60.0%
060750309006008	97	38	59	60.8%
060750309006009	71	52	19	26.8%
060750309006010	69	44	25	36.2%
060750309007000	55	38	17	30.9%
060750309007001	65	42	23	35.4%
060750309007002	81	33	48	59.3%
060750309007003	44	22	22	50.0%
060750309007004	63	43	20	31.7%
060750309007005	156	64	92	59.0%
060750309007006	78	40	38	48.7%
060750309007007	33	13	20	60.6%
060750309007008	36	6	30	83.3%
060750309007009	59	32	27	45.8%
060750309007010	103	47	56	54.4%
060750309007011	105	40	65	61.9%
060750310001000	52	26	26	50.0%
060750310001001	80	54	26	32.5%
060750310001002	104	67	37	35.6%
060750310001003	38	35	3	7.9%
060750310001004	70	54	16	22.9%
060750310001005	53	31	22	41.5%
060750310001006	42	26	16	38.1%
060750310001007	53	32	21	39.6%
060750310001008	60	40	20	33.3%
060750310001009	41	18	23	56.1%
060750310001010	46	24	22	47.8%
060750310001011	50	33	17	34.0%
060750310001012	54	41	13	24.1%
060750310001013	77	56	21	27.3%

Block Group	Popu- lation	Non Hispanic White	Minority	Percent Minority
060750310002000	67	26	41	61.2%
060750310002001	26	14	12	46.2%
060750310002002	54	29	25	46.3%
060750310002003	61	32	29	47.5%
060750310002004	55	26	29	52.7%
060750310002005	52	26	26	50.0%
060750310002006	28	10	18	64.3%
060750310002007	73	46	27	37.0%
060750310002008	4	4	0	0.0%
060750310002009	43	11	32	74.4%
060750310002010	57	33	24	42.1%
060750310002011	75	48	27	36.0%
060750310002012	163	60	103	63.2%
060750310002014	116	40	76	65.5%
060750310002015	46	25	21	45.7%
060750310002016	25	16	9	36.0%
060750310002017	91	45	46	50.5%
060750310002018	74	27	47	63.5%
060750310002019	70	28	42	60.0%
060750310003000	45	28	17	37.8%
060750310003001	112	46	66	58.9%
060750310003002	31	17	14	45.2%
060750310003004	82	42	40	48.8%
060750310003005	33	19	14	42.4%
060750310003006	74	39	35	47.3%
060750310003007	69	52	17	24.6%
060750310003008	75	43	32	42.7%
060750310003009	476	154	322	67.6%
060750310003010	141	61	80	56.7%
060750310003011	323	104	219	67.8%
060750310003012	29	13	16	55.2%
060750310003013	66	38	28	42.4%
060750311001001	118	53	65	55.1%
060750311001002	19	13	6	31.6%
060750311001003	362	203	159	43.9%
060750311001004	94	51	43	45.7%
060750311001005	152	72	80	52.6%
060750311001006	117	60	57	48.7%
060750311001007	109	61	48	44.0%
060750311001008	23	7	16	69.6%
060750311002000	134	65	69	51.5%
060750311002001	189	57	132	69.8%
060750311002002	203	86	117	57.6%
060750311002003	161	78	83	51.6%
060750311002004	148	69	79	53.4%
060750311002005	151	50	101	66.9%
060750311002007	35	12	23	65.7%
060750311002008	153	52	101	66.0%
060750311002009	143	70	73	51.0%
060750311002010	125	51	74	59.2%
060750311002011	41	22	19	46.3%
060750311003001	109	49	60	55.0%
060750311003002	143	56	87	60.8%
060750311003003	65	10	55	84.6%
060750311003004	104	48	56	53.8%
060750311003005	162	44	118	72.8%
060750311003006	90	17	73	81.1%
060750311003007	62	29	33	53.2%
060750311004000	183	70	113	61.7%
060750311004001	153	58	95	62.1%
060750311004002	159	79	80	50.3%
060750311004003	129	57	72	55.8%
060750311004004	161	50	111	68.9%
060750311004005	37	6	31	83.8%
060750311004006	143	63	80	55.9%
060750311004007	149	53	96	64.4%
060750311004008	97	49	48	49.5%
060750311004009	74	37	37	50.0%
060750311005000	124	60	64	51.6%
060750311005001	121	42	79	65.3%
060750311005002	108	64	44	40.7%
060750311005003	176	77	99	56.3%
060750311005004	102	66	36	35.3%
060750311005005	112	75	37	33.0%
060750311005006	200	82	118	59.0%
060750311005007	161	51	110	68.3%
060750311005008	114	37	77	67.5%
060750311005009	227	96	131	57.7%
060750311005010	195	87	108	55.4%
060750311005011	141	77	64	45.4%
060750312001000	31	5	26	83.9%
060750312001001	177	5	172	97.2%
060750312001002	152	16	136	89.5%
060750312001003	49	0	49	100.0%
060750312001004	117	7	110	94.0%
060750312001005	126	13	113	89.7%
060750312001006	103	13	90	87.4%
060750312001007	82	17	65	79.3%
060750312001008	53	12	41	77.4%
060750312001009	63	8	55	87.3%
060750312001010	213	19	194	91.1%
060750312001011	145	26	119	82.1%
060750312001012	160	15	145	90.6%
060750312001013	123	20	103	83.7%
060750312002000	275	25	250	90.9%
060750312002001	44	5	39	88.6%
060750312002002	213	22	191	89.7%
060750312002003	229	18	211	92.1%
060750312002004	176	19	157	89.2%
060750312002005	137	40	97	70.8%
060750312002006	179	22	157	87.7%
060750312003000	94	12	82	87.2%
060750312003001	401	29	372	92.8%
060750312003002	239	14	225	94.1%
060750312003003	105	18	87	82.9%
060750312003004	203	26	177	87.2%
060750312003005	272	32	240	88.2%
060750312003006	233	15	218	93.6%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750312003007	222	27	195	87.8%
060750312003008	259	32	227	87.6%
060750312003009	208	25	183	88.0%
060750312004000	209	34	175	83.7%
060750312004001	199	26	173	86.9%
060750312004002	276	14	262	94.9%
060750312004003	216	35	181	83.8%
060750312004004	298	74	224	75.2%
060750312004005	80	20	60	75.0%
060750312004006	263	51	212	80.6%
060750312005000	77	17	60	77.9%
060750312005001	95	26	69	72.6%
060750312005002	94	23	71	75.5%
060750312005003	117	27	90	76.9%
060750312005004	192	24	168	87.5%
060750312005005	180	35	145	80.6%
060750312006000	254	15	239	94.1%
060750312006001	211	44	167	79.1%
060750312006002	157	18	139	88.5%
060750312006003	124	33	91	73.4%
060750312006004	189	12	177	93.7%
060750312006005	173	33	140	80.9%
060750313001000	55	17	38	69.1%
060750313001001	95	22	73	76.8%
060750313001002	139	28	111	79.9%
060750313001003	140	34	106	75.7%
060750313001004	157	28	129	82.2%
060750313001005	145	43	102	70.3%
060750313001006	140	27	113	80.7%
060750313001007	142	18	124	87.3%
060750313001008	153	19	134	87.6%
060750313001009	39	15	24	61.5%
060750313002000	149	17	132	88.6%
060750313002001	170	12	158	92.9%
060750313002002	150	12	138	92.0%
060750313002003	184	44	140	76.1%
060750313002004	167	7	160	95.8%
060750313002005	206	2	204	99.0%
060750313002006	159	4	155	97.5%
060750313002007	196	18	178	90.8%
060750313003000	184	23	161	87.5%
060750313003001	676	38	638	94.4%
060750313003003	220	45	175	79.5%
060750313003005	138	39	99	71.7%
060750313003006	34	4	30	88.2%
060750313003008	173	23	150	86.7%
060750313003009	121	23	98	81.0%
060750313003010	66	9	57	86.4%
060750313003011	79	17	62	78.5%
060750313003012	42	2	40	95.2%
060750313003013	22	3	19	86.4%
060750313003015	47	5	42	89.4%
060750313003016	43	5	38	88.4%
060750313004000	138	6	132	95.7%
060750313004001	151	7	144	95.4%
060750313004002	169	27	142	84.0%
060750313004003	212	33	179	84.4%
060750313004004	59	8	51	86.4%
060750313004006	155	38	117	75.5%
060750313004007	474	43	431	90.9%
060750313005000	150	57	93	62.0%
060750313005001	145	23	122	84.1%
060750313005002	168	37	131	78.0%
060750313005003	129	29	100	77.5%
060750313005004	134	36	98	73.1%
060750313005005	136	37	99	72.8%
060750313005006	64	8	56	87.5%
060750313005008	109	21	88	80.7%
060750313005009	96	14	82	85.4%
060750313005010	148	14	134	90.5%
060750313005011	161	25	136	84.5%
060750313006000	162	27	135	83.3%
060750313006001	129	23	106	82.2%
060750313006002	149	35	114	76.5%
060750313006003	146	40	106	72.6%
060750313006004	164	47	117	71.3%
060750313006005	153	43	110	71.9%
060750313006006	69	19	50	72.5%
060750314001000	143	24	119	83.2%
060750314001001	104	23	81	77.9%
060750314001002	190	29	161	84.7%
060750314001003	139	16	123	88.5%
060750314001004	154	23	131	85.1%
060750314002000	10	3	7	70.0%
060750314002001	181	22	159	87.8%
060750314002002	570	56	514	90.2%
060750314002003	413	28	385	93.2%
060750314002004	208	20	188	90.4%
060750314002005	151	12	139	92.1%
060750314003000	47	2	45	95.7%
060750314003001	218	21	197	90.4%
060750314003002	319	23	296	92.8%
060750314003003	232	27	205	88.4%
060750314003004	234	13	221	94.4%
060750314003005	145	5	140	96.6%
060750314003006	87	8	79	90.8%
060750314004001	265	9	256	96.6%
060750314004002	161	17	144	89.4%
060750314004003	265	20	245	92.5%
060750314004004	288	22	266	92.4%
060750314004005	253	18	235	92.9%
060750314005000	236	26	210	89.0%
060750314005001	231	48	183	79.2%
060750314005002	199	22	177	88.9%
060750314005003	82	8	74	90.2%
060750314005004	280	17	263	93.9%
060750314005005	307	23	284	92.5%
060750326001000	238	134	104	43.7%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750326001001	342	133	209	61.1%
060750326001002	224	106	118	52.7%
060750326001003	228	84	144	63.2%
060750326001004	172	81	91	52.9%
060750326001005	204	136	68	33.3%
060750326001006	167	75	92	55.1%
060750326002000	239	113	126	52.7%
060750326002001	281	124	157	55.9%
060750326002002	157	74	83	52.9%
060750326002003	141	44	97	68.8%
060750326002004	159	56	103	64.8%
060750326002005	140	64	76	54.3%
060750326002006	217	102	115	53.0%
060750326003000	246	96	150	61.0%
060750326003001	298	144	154	51.7%
060750326003002	171	58	113	66.1%
060750326003003	188	54	134	71.3%
060750326003004	164	68	96	58.5%
060750326003005	211	68	143	67.8%
060750326003006	204	59	145	71.1%
060750326004000	188	107	81	43.1%
060750326004001	182	49	133	73.1%
060750326004002	189	55	134	70.9%
060750326004003	186	67	119	64.0%
060750326004004	141	48	93	66.0%
060750326004005	221	55	166	75.1%
060750326004006	203	67	136	67.0%
060750326005001	170	74	96	56.5%
060750326005002	195	62	133	68.2%
060750326005003	151	60	91	60.3%
060750326005004	191	53	138	72.3%
060750326005005	193	58	135	69.9%
060750326005006	152	45	107	70.4%
060750326006000	132	37	95	72.0%
060750326006001	145	63	82	56.6%
060750326006002	188	91	97	51.6%
060750326006003	268	107	161	60.1%
060750326006004	227	80	147	64.8%
060750326006005	184	57	127	69.0%
060750326006006	172	50	122	70.9%
060750326006007	170	72	98	57.6%
060750326006008	186	79	107	57.5%
060750326006009	180	55	125	69.4%
060750327001000	113	55	58	51.3%
060750327001001	126	59	67	53.2%
060750327001002	131	48	83	63.4%
060750327001003	150	46	104	69.3%
060750327001004	158	76	82	51.9%
060750327001005	205	76	129	62.9%
060750327002000	171	60	111	64.9%
060750327002001	196	86	110	56.1%
060750327002002	181	106	75	41.4%
060750327002003	239	105	134	56.1%
060750327002004	185	75	110	59.5%
060750327002005	246	115	131	53.3%
060750327003000	205	83	122	59.5%
060750327003001	189	92	97	51.3%
060750327003002	178	61	117	65.7%
060750327003003	199	94	105	52.8%
060750327003004	177	90	87	49.2%
060750327003005	193	70	123	63.7%
060750327004000	158	51	107	67.7%
060750327004001	151	70	81	53.6%
060750327004002	60	19	41	68.3%
060750327004003	164	48	116	70.7%
060750327004004	154	57	97	63.0%
060750327004005	152	85	67	44.1%
060750327005001	165	53	112	67.9%
060750327005002	139	42	97	69.8%
060750327005003	145	59	86	59.3%
060750327005004	181	58	123	68.0%
060750327005005	156	38	118	75.6%
060750327006000	187	73	114	61.0%
060750327006001	102	51	51	50.0%
060750327006002	113	71	42	37.2%
060750327006005	145	59	86	59.3%
060750327006006	151	65	86	57.0%
060750327006007	124	65	59	47.6%
060750327007000	198	78	120	60.6%
060750327007001	181	73	108	59.7%
060750327007002	1	0	1	100.0%
060750327007004	180	75	105	58.3%
060750327007005	173	45	128	74.0%
060750327007006	76	47	29	38.2%
060750328001000	57	10	47	82.5%
060750328001001	143	44	99	69.2%
060750328001002	145	44	101	69.7%
060750328001003	197	77	120	60.9%
060750328001004	134	51	83	61.9%
060750328001005	176	73	103	58.5%
060750328001006	87	26	61	70.1%
060750328001007	160	49	111	69.4%
060750328001008	140	70	70	50.0%
060750328002000	307	93	214	69.7%
060750328002001	182	72	110	60.4%
060750328002002	138	46	92	66.7%
060750328002003	189	65	124	65.6%
060750328002004	166	28	138	83.1%
060750328002005	126	39	87	69.0%
060750328002006	194	60	134	69.1%
060750328002007	177	46	131	74.0%
060750328002008	196	59	137	69.9%
060750328003000	192	43	149	77.6%
060750328003001	216	74	142	65.7%
060750328003002	200	105	95	47.5%
060750328003004	202	110	92	45.5%
060750328003005	157	54	103	65.6%
060750328003006	177	77	100	56.5%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750328003007	194	64	130	67.0%
060750328004001	123	31	92	74.8%
060750328004002	134	54	80	59.7%
060750328004003	161	55	106	65.8%
060750328004004	166	43	123	74.1%
060750328004005	182	53	129	70.9%
060750328004006	155	56	99	63.9%
060750328004007	162	49	113	69.8%
060750328004008	162	84	78	48.1%
060750328005000	195	78	117	60.0%
060750328005001	200	77	123	61.5%
060750328005002	148	59	89	60.1%
060750328005003	171	78	93	54.4%
060750328005005	163	56	107	65.6%
060750328005006	160	53	107	66.9%
060750328005007	151	50	101	66.9%
060750328005008	166	61	105	63.3%
060750328006000	170	66	104	61.2%
060750328006001	143	40	103	72.0%
060750328006002	122	48	74	60.7%
060750328006003	162	45	117	72.2%
060750328006004	131	40	91	69.5%
060750328006005	156	48	108	69.2%
060750328006006	143	57	86	60.1%
060750328006007	156	66	90	57.7%
060750329001000	139	56	83	59.7%
060750329001001	179	47	132	73.7%
060750329001002	81	30	51	63.0%
060750329001003	130	34	96	73.8%
060750329001004	137	46	91	66.4%
060750329001005	137	50	87	63.5%
060750329001006	171	64	107	62.6%
060750329001007	150	44	106	70.7%
060750329002000	160	54	106	66.3%
060750329002001	151	62	89	58.9%
060750329002002	167	25	142	85.0%
060750329002003	152	41	111	73.0%
060750329002004	120	43	77	64.2%
060750329002005	185	37	148	80.0%
060750329002006	158	58	100	63.3%
060750329002007	156	43	113	72.4%
060750329003000	144	39	105	72.9%
060750329003001	149	43	106	71.1%
060750329003002	154	48	106	68.8%
060750329003003	188	40	148	78.7%
060750329003004	147	47	100	68.0%
060750329003005	127	36	91	71.7%
060750329003006	153	41	112	73.2%
060750329003007	169	48	121	71.6%
060750329004000	164	55	109	66.5%
060750329004001	145	45	100	69.0%
060750329004002	155	58	97	62.6%
060750329004003	149	39	110	73.8%
060750329004004	174	52	122	70.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750329004005	154	40	114	74.0%
060750329004007	132	66	66	50.0%
060750329005000	131	55	76	58.0%
060750329005001	180	53	127	70.6%
060750329005002	125	71	54	43.2%
060750329005003	154	60	94	61.0%
060750329005004	167	65	102	61.1%
060750329005005	135	57	78	57.8%
060750329005006	149	54	95	63.8%
060750329005007	176	58	118	67.0%
060750329006000	142	46	96	67.6%
060750329006001	141	76	65	46.1%
060750329006002	164	44	120	73.2%
060750329006003	170	67	103	60.6%
060750329006004	178	61	117	65.7%
060750329006005	154	49	105	68.2%
060750329006006	141	47	94	66.7%
060750329006007	143	75	68	47.6%
060750329007000	144	43	101	70.1%
060750329007001	206	75	131	63.6%
060750329007002	229	65	164	71.6%
060750329007003	144	41	103	71.5%
060750329007004	150	49	101	67.3%
060750329007005	157	57	100	63.7%
060750329007006	171	65	106	62.0%
060750329007007	124	51	73	58.9%
060750330001000	130	56	74	56.9%
060750330001001	96	43	53	55.2%
060750330001002	101	66	35	34.7%
060750330001003	176	94	82	46.6%
060750330001004	209	78	131	62.7%
060750330001005	149	65	84	56.4%
060750330001006	178	79	99	55.6%
060750330001007	157	50	107	68.2%
060750330001008	159	89	70	44.0%
060750330002001	170	68	102	60.0%
060750330002002	127	40	87	68.5%
060750330002003	142	62	80	56.3%
060750330002004	139	79	60	43.2%
060750330002005	75	36	39	52.0%
060750330002006	138	68	70	50.7%
060750330002007	119	64	55	46.2%
060750330002008	162	49	113	69.8%
060750330003000	2	1	1	50.0%
060750330003001	167	80	87	52.1%
060750330003002	170	58	112	65.9%
060750330003003	145	74	71	49.0%
060750330003004	125	77	48	38.4%
060750330003005	135	73	62	45.9%
060750330003006	106	73	33	31.1%
060750330003007	104	56	48	46.2%
060750330003008	88	41	47	53.4%
060750330003009	148	63	85	57.4%
060750330003010	88	51	37	42.0%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060750330003011	209	126	83	39.7%
060750330004000	20	6	14	70.0%
060750330004001	24	19	5	20.8%
060750330004002	44	19	25	56.8%
060750330004003	30	20	10	33.3%
060750330004004	23	10	13	56.5%
060750330004005	14	7	7	50.0%
060750330004006	74	39	35	47.3%
060750330004007	75	34	41	54.7%
060750330004008	52	19	33	63.5%
060750330004009	78	35	43	55.1%
060750330004010	97	61	36	37.1%
060750330004011	154	49	105	68.2%
060750330004014	127	66	61	48.0%
060750330004015	87	50	37	42.5%
060750330004016	37	23	14	37.8%
060750330004017	77	45	32	41.6%
060750330004018	53	29	24	45.3%
060750330005000	139	56	83	59.7%
060750330005001	201	88	113	56.2%
060750330005002	169	56	113	66.9%
060750330005003	152	38	114	75.0%
060750330005004	155	56	99	63.9%
060750330005005	151	44	107	70.9%
060750330005006	129	38	91	70.5%
060750330005007	163	77	86	52.8%
060750330006000	156	67	89	57.1%
060750330006001	159	59	100	62.9%
060750330006002	142	66	76	53.5%
060750330006003	151	48	103	68.2%
060750330006004	142	72	70	49.3%
060750330006005	166	64	102	61.4%
060750330006006	195	61	134	68.7%
060750330006007	146	44	102	69.9%
060750331001000	82	34	48	58.5%
060750331001001	70	38	32	45.7%
060750331001002	69	37	32	46.4%
060750331001004	74	46	28	37.8%
060750331001005	40	29	11	27.5%
060750331001006	63	31	32	50.8%
060750331001007	32	24	8	25.0%
060750331001008	50	31	19	38.0%
060750331001009	67	33	34	50.7%
060750331001010	56	17	39	69.6%
060750331002000	79	61	18	22.8%
060750331002001	75	36	39	52.0%
060750331002002	105	43	62	59.0%
060750331002003	135	46	89	65.9%
060750331002004	123	53	70	56.9%
060750331002005	105	59	46	43.8%
060750331002006	67	39	28	41.8%
060750331002007	79	34	45	57.0%
060750331002008	61	32	29	47.5%
060750331002009	66	25	41	62.1%
060750331002010	55	21	34	61.8%
060750331002011	55	31	24	43.6%
060750331003000	125	71	54	43.2%
060750331003001	116	25	91	78.4%
060750331003002	113	60	53	46.9%
060750331003003	80	35	45	56.3%
060750331003004	44	19	25	56.8%
060750331003005	49	38	11	22.4%
060750331003006	66	45	21	31.8%
060750331003007	75	48	27	36.0%
060750331003008	102	51	51	50.0%
060750331004000	7	2	5	71.4%
060750331004002	58	25	33	56.9%
060750331004003	63	32	31	49.2%
060750331004005	47	15	32	68.1%
060750331004006	35	21	14	40.0%
060750331004007	56	27	29	51.8%
060750331004008	113	66	47	41.6%
060750331004009	108	67	41	38.0%
060750331004012	111	43	68	61.3%
060750332011001	141	68	73	51.8%
060750332011004	139	58	81	58.3%
060750332011005	89	59	30	33.7%
060750332011006	2476	1209	1267	51.2%
060750332011007	67	23	44	65.7%
060750332011008	163	45	118	72.4%
060750332021001	51	18	33	64.7%
060750332021002	127	52	75	59.1%
060750332021003	147	54	93	63.3%
060750332021004	148	58	90	60.8%
060750332021005	30	6	24	80.0%
060750332021007	36	11	25	69.4%
060750332021008	18	3	15	83.3%
060750332021009	148	65	83	56.1%
060750332021010	38	18	20	52.6%
060750332021011	77	19	58	75.3%
060750332021012	138	55	83	60.1%
060750332021013	115	45	70	60.9%
060750332022001	172	72	100	58.1%
060750332022002	671	346	325	48.4%
060750332022003	7	3	4	57.1%
060750332022004	977	465	512	52.4%
060750332022005	331	112	219	66.2%
060750332023000	137	56	81	59.1%
060750332023001	142	59	83	58.5%
060750332023002	84	54	30	35.7%
060750332023003	1458	687	771	52.9%
060750332023004	59	25	34	57.6%
060750332023005	108	58	50	46.3%
060750332024000	222	108	114	51.4%
060750332024001	193	101	92	47.7%
060750332024002	118	50	68	57.6%
060750332024003	63	40	23	36.5%
060750332024004	100	54	46	46.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750332025000	152	55	97	63.8%
060750332025001	164	57	107	65.2%
060750332025002	47	19	28	59.6%
060750332025003	625	251	374	59.8%
060750332025004	187	60	127	67.9%
060750332025005	168	75	93	55.4%
060750351001001	225	88	137	60.9%
060750351002001	229	73	156	68.1%
060750351003001	157	75	82	52.2%
060750351004001	189	72	117	61.9%
060750351005001	147	73	74	50.3%
060750351006001	114	38	76	66.7%
060750351007001	137	47	90	65.7%
060750353001001	25	21	4	16.0%
060750353001005	160	61	99	61.9%
060750353002001	166	79	87	52.4%
060750353002008	172	63	109	63.4%
060750353003001	151	53	98	64.9%
060750353003008	165	64	101	61.2%
060750401001000	323	270	53	16.4%
060750401001001	55	45	10	18.2%
060750401001002	160	97	63	39.4%
060750401001003	158	103	55	34.8%
060750401001004	184	104	80	43.5%
060750401002000	102	43	59	57.8%
060750401002001	84	54	30	35.7%
060750401002002	40	16	24	60.0%
060750401002003	300	139	161	53.7%
060750401002004	248	140	108	43.5%
060750401002005	331	140	191	57.7%
060750401003000	228	94	134	58.8%
060750401003001	267	112	155	58.1%
060750401003002	238	116	122	51.3%
060750401003003	237	79	158	66.7%
060750401003004	296	138	158	53.4%
060750401003005	215	95	120	55.8%
060750401004000	167	154	13	7.8%
060750401004001	183	133	50	27.3%
060750401004002	189	108	81	42.9%
060750401004003	31	20	11	35.5%
060750401004004	29	26	3	10.3%
060750401004005	283	109	174	61.5%
060750402001000	211	183	28	13.3%
060750402001001	114	101	13	11.4%
060750402001002	281	150	131	46.6%
060750402001003	235	128	107	45.5%
060750402001004	229	135	94	41.0%
060750402001005	302	151	151	50.0%
060750402001006	241	64	177	73.4%
060750402001007	36	9	27	75.0%
060750402002000	40	16	24	60.0%
060750402002001	184	106	78	42.4%
060750402002002	278	134	144	51.8%
060750402002003	291	123	168	57.7%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750402002004	198	58	140	70.7%
060750402002005	3	0	3	100.0%
060750402003000	259	149	110	42.5%
060750402003001	238	108	130	54.6%
060750402003002	216	103	113	52.3%
060750402003003	383	161	222	58.0%
060750402003004	187	98	89	47.6%
060750402004000	176	147	29	16.5%
060750402004001	261	167	94	36.0%
060750402004002	206	110	96	46.6%
060750402004003	239	127	112	46.9%
060750402004004	250	138	112	44.8%
060750402004005	306	187	119	38.9%
060750426001001	207	126	81	39.1%
060750426001002	188	116	72	38.3%
060750426001003	214	130	84	39.3%
060750426001004	238	136	102	42.9%
060750426001005	206	113	93	45.1%
060750426002001	240	139	101	42.1%
060750426002002	223	117	106	47.5%
060750426002003	250	135	115	46.0%
060750426002004	298	143	155	52.0%
060750426002005	237	86	151	63.7%
060750426003001	200	106	94	47.0%
060750426003002	246	118	128	52.0%
060750426003003	140	58	82	58.6%
060750426003004	173	94	79	45.7%
060750426003005	224	118	106	47.3%
060750426004000	251	130	121	48.2%
060750426004001	284	155	129	45.4%
060750426004002	267	114	153	57.3%
060750426004003	316	134	182	57.6%
060750426004004	206	83	123	59.7%
060750426004005	259	138	121	46.7%
060750426004006	148	70	78	52.7%
060750426005000	340	205	135	39.7%
060750426005001	250	130	120	48.0%
060750426005002	270	154	116	43.0%
060750426005003	216	109	107	49.5%
060750426005004	255	164	91	35.7%
060750426005005	292	124	168	57.5%
060750426005006	334	167	167	50.0%
060750426005007	228	120	108	47.4%
060750427001000	166	70	96	57.8%
060750427001001	348	189	159	45.7%
060750427001002	344	207	137	39.8%
060750427001003	300	148	152	50.7%
060750427001004	257	128	129	50.2%
060750427001005	364	155	209	57.4%
060750427002000	264	115	149	56.4%
060750427002001	348	182	166	47.7%
060750427002002	306	157	149	48.7%
060750427002003	292	150	142	48.6%
060750427002004	303	188	115	38.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750427002006	343	146	197	57.4%
060750427003000	235	126	109	46.4%
060750427003001	279	144	135	48.4%
060750427003002	239	103	136	56.9%
060750427003003	204	85	119	58.3%
060750427003004	287	147	140	48.8%
060750427003006	186	75	111	59.7%
060750427003007	322	125	197	61.2%
060750428001001	87	76	11	12.6%
060750428001002	51	48	3	5.9%
060750428001003	58	46	12	20.7%
060750428001004	38	31	7	18.4%
060750428001005	100	81	19	19.0%
060750428001006	174	129	45	25.9%
060750428001007	112	60	52	46.4%
060750428002000	99	84	15	15.2%
060750428002001	179	138	41	22.9%
060750428002002	163	130	33	20.2%
060750428002003	107	90	17	15.9%
060750428002004	59	44	15	25.4%
060750428002005	47	32	15	31.9%
060750428002006	44	32	12	27.3%
060750428002007	221	165	56	25.3%
060750428002008	89	65	24	27.0%
060750428002009	81	60	21	25.9%
060750428003000	14	10	4	28.6%
060750428003001	129	90	39	30.2%
060750428003002	56	44	12	21.4%
060750428003003	65	48	17	26.2%
060750428003004	55	39	16	29.1%
060750428003005	51	37	14	27.5%
060750428003006	46	45	1	2.2%
060750428003007	44	33	11	25.0%
060750428003008	191	147	44	23.0%
060750428003010	37	28	9	24.3%
060750451001000	372	175	197	53.0%
060750451001001	237	78	159	67.1%
060750451001002	289	87	202	69.9%
060750451001003	401	150	251	62.6%
060750451001004	335	180	155	46.3%
060750451001005	272	100	172	63.2%
060750451001006	126	87	39	31.0%
060750451001007	205	138	67	32.7%
060750451002000	284	116	168	59.2%
060750451002001	309	111	198	64.1%
060750451002002	315	97	218	69.2%
060750451002003	338	154	184	54.4%
060750451002004	121	61	60	49.6%
060750451002005	97	65	32	33.0%
060750451003000	231	66	165	71.4%
060750451003001	307	91	216	70.4%
060750451003003	327	103	224	68.5%
060750451003004	292	118	174	59.6%
060750451003005	244	80	164	67.2%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750452001000	230	79	151	65.7%
060750452001001	322	144	178	55.3%
060750452001002	304	190	114	37.5%
060750452001003	231	95	136	58.9%
060750452001004	297	104	193	65.0%
060750452001005	346	89	257	74.3%
060750452002000	223	85	138	61.9%
060750452002001	261	96	165	63.2%
060750452002002	315	117	198	62.9%
060750452002003	238	150	88	37.0%
060750452002004	204	98	106	52.0%
060750452002005	328	161	167	50.9%
060750452003000	226	99	127	56.2%
060750452003001	188	94	94	50.0%
060750452003002	286	158	128	44.8%
060750452003003	116	67	49	42.2%
060750452003004	207	94	113	54.6%
060750452003005	1	0	1	100.0%
060750452003006	6	1	5	83.3%
060750452004000	142	64	78	54.9%
060750452004001	134	56	78	58.2%
060750452004002	202	82	120	59.4%
060750452004003	132	47	85	64.4%
060750452004004	264	131	133	50.4%
060750452004005	285	139	146	51.2%
060750452005000	185	80	105	56.8%
060750452005001	291	105	186	63.9%
060750452005002	328	152	176	53.7%
060750452005003	227	108	119	52.4%
060750452005005	1	0	1	100.0%
060750452005006	175	82	93	53.1%
060750476001001	315	153	162	51.4%
060750476001002	247	127	120	48.6%
060750476001003	145	59	86	59.3%
060750476001004	198	64	134	67.7%
060750476001005	149	52	97	65.1%
060750476001006	328	142	186	56.7%
060750476002001	239	111	128	53.6%
060750476002002	208	80	128	61.5%
060750476002003	286	72	214	74.8%
060750476002004	188	75	113	60.1%
060750476002005	282	88	194	68.8%
060750476002006	250	110	140	56.0%
060750476003001	118	75	43	36.4%
060750476003002	242	94	148	61.2%
060750476003003	208	86	122	58.7%
060750476003004	101	21	80	79.2%
060750476003005	214	72	142	66.4%
060750476003006	218	73	145	66.5%
060750476004001	239	147	92	38.5%
060750476004002	215	119	96	44.7%
060750476004003	239	113	126	52.7%
060750476004004	251	99	152	60.6%
060750476004005	266	113	153	57.5%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750476004006	285	120	165	57.9%
060750477011000	249	106	143	57.4%
060750477011001	297	108	189	63.6%
060750477011002	332	180	152	45.8%
060750477011003	204	64	140	68.6%
060750477011004	231	110	121	52.4%
060750477011005	271	130	141	52.0%
060750477012000	213	105	108	50.7%
060750477012001	302	96	206	68.2%
060750477012002	314	181	133	42.4%
060750477012003	271	84	187	69.0%
060750477012004	252	102	150	59.5%
060750477012005	273	99	174	63.7%
060750477013000	190	75	115	60.5%
060750477013001	254	96	158	62.2%
060750477013002	315	119	196	62.2%
060750477013003	249	110	139	55.8%
060750477013004	196	73	123	62.8%
060750477013005	205	72	133	64.9%
060750477021000	227	51	176	77.5%
060750477021001	143	53	90	62.9%
060750477021002	210	71	139	66.2%
060750477021003	254	101	153	60.2%
060750477021004	167	54	113	67.7%
060750477021005	192	61	131	68.2%
060750477022000	236	33	203	86.0%
060750477022001	227	54	173	76.2%
060750477022002	235	82	153	65.1%
060750477022003	177	52	125	70.6%
060750477022004	259	139	120	46.3%
060750477022005	288	143	145	50.3%
060750477023000	185	90	95	51.4%
060750477023001	278	116	162	58.3%
060750477023002	367	258	109	29.7%
060750477023003	177	86	91	51.4%
060750477023004	144	65	79	54.9%
060750477023005	180	71	109	60.6%
060750478001000	253	104	149	58.9%
060750478001001	27	7	20	74.1%
060750478001002	237	104	133	56.1%
060750478001003	279	145	134	48.0%
060750478001004	173	70	103	59.5%
060750478001005	216	87	129	59.7%
060750478001006	134	41	93	69.4%
060750478001007	189	59	130	68.8%
060750478001008	216	77	139	64.4%
060750478002000	200	85	115	57.5%
060750478002001	241	128	113	46.9%
060750478002002	236	107	129	54.7%
060750478002003	185	92	93	50.3%
060750478002004	175	65	110	62.9%
060750478002005	194	71	123	63.4%
060750478003005	178	65	113	63.5%
060750478004000	294	167	127	43.2%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750478004001	232	90	142	61.2%
060750478004004	196	75	121	61.7%
060750478004005	157	54	103	65.6%
060750478005000	191	69	122	63.9%
060750601001008	17	12	5	29.4%
060750601001009	12	0	12	100.0%
060750601001010	29	8	21	72.4%
060750601001012	42	20	22	52.4%
060750601001027	9	5	4	44.4%
060750601001028	14	14	0	0.0%
060750601001029	249	169	80	32.1%
060750601001032	4	0	4	100.0%
060750601001033	4	3	1	25.0%
060750601001039	4	4	0	0.0%
060750601001051	19	14	5	26.3%
060750601001052	9	9	0	0.0%
060750601001053	635	435	200	31.5%
060750601001054	102	81	21	20.6%
060750601001056	20	18	2	10.0%
060750601001082	6	4	2	33.3%
060750601001097	4	4	0	0.0%
060750601001100	1	0	1	100.0%
060750601001108	22	21	1	4.5%
060750601001109	36	31	5	13.9%
060750601001110	44	38	6	13.6%
060750601001111	16	16	0	0.0%
060750601001112	19	18	1	5.3%
060750601001113	4	4	0	0.0%
060750601001115	49	36	13	26.5%
060750601001116	4	4	0	0.0%
060750601001119	2	2	0	0.0%
060750601001120	51	42	9	17.6%
060750601001123	34	20	14	41.2%
060750601001124	13	5	8	61.5%
060750601001126	37	35	2	5.4%
060750601001127	25	22	3	12.0%
060750601001139	24	19	5	20.8%
060750601001141	3	3	0	0.0%
060750601001142	200	140	60	30.0%
060750601001143	471	347	124	26.3%
060750603001003	2	1	1	50.0%
060750603001004	6	5	1	16.7%
060750603001008	6	3	3	50.0%
060750603001009	2	0	2	100.0%
060750603001011	2	2	0	0.0%
060750603001022	2	2	0	0.0%
060750603001024	2	1	1	50.0%
060750603001026	3	2	1	33.3%
060750603001028	4	2	2	50.0%
060750603001031	4	2	2	50.0%
060750603001034	9	7	2	22.2%
060750603001038	1	1	0	0.0%
060750603001039	14	5	9	64.3%
060750603001040	8	8	0	0.0%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750603001042	13	12	1	7.7%
060750603001044	51	34	17	33.3%
060750603001047	1	1	0	0.0%
060750604001013	298	222	76	25.5%
060750605011000	117	9	108	92.3%
060750605011002	2	0	2	100.0%
060750605011006	293	7	286	97.6%
060750605021000	517	11	506	97.9%
060750605021001	431	7	424	98.4%
060750605022000	513	12	501	97.7%
060750605022001	458	10	448	97.8%
060750605023000	221	2	219	99.1%
060750605023001	612	30	582	95.1%
060750605023002	133	7	126	94.7%
060750605023003	175	5	170	97.1%
060750605023004	154	9	145	94.2%
060750605023005	200	4	196	98.0%
060750605023006	2	2	0	0.0%
060750606001000	530	28	502	94.7%
060750607001000	14	13	1	7.1%
060750607001008	18	11	7	38.9%
060750607001011	141	112	29	20.6%
060750607001017	48	45	3	6.3%
060750607001020	1	1	0	0.0%
060750607001022	22	5	17	77.3%
060750607001024	5	0	5	100.0%
060750607001025	14	4	10	71.4%
060750607001027	11	7	4	36.4%
060750607001032	8	2	6	75.0%
060750607001033	5	4	1	20.0%
060750607001040	4	4	0	0.0%
060750607002000	4	3	1	25.0%
060750607002001	11	6	5	45.5%
060750607002003	8	5	3	37.5%
060750607002004	9	6	3	33.3%
060750607002008	2	2	0	0.0%
060750607002020	6	5	1	16.7%
060750607002022	12	11	1	8.3%
060750607003000	215	78	137	63.7%
060750607003001	118	42	76	64.4%
060750609001004	42	0	42	100.0%
060750609001006	5	4	1	20.0%
060750609001008	32	22	10	31.3%
060750609001019	9	2	7	77.8%
060750609001026	14	8	6	42.9%
060750609001033	18	3	15	83.3%
060750609001034	5	1	4	80.0%
060750609002000	9	2	7	77.8%
060750609002001	7	2	5	71.4%
060750609002008	12	10	2	16.7%
060750609002012	3	1	2	66.7%
060750609002016	45	22	23	51.1%
060750609002021	15	3	12	80.0%
060750609002025	7	4	3	42.9%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060750609002029	8	3	5	62.5%
060750609002030	9	0	9	100.0%
060750609002033	18	10	8	44.4%
060750609002035	15	4	11	73.3%
060750609002037	3	1	2	66.7%
060750609002040	3	2	1	33.3%
060750609002041	4	0	4	100.0%
060750609002043	28	10	18	64.3%
060750609002049	99	49	50	50.5%
060750609002051	1	1	0	0.0%
060750610001001	10	3	7	70.0%
060750610001002	82	3	79	96.3%
060750610001003	70	0	70	100.0%
060750610001004	78	0	78	100.0%
060750610001005	279	37	242	86.7%
060750610001007	22	7	15	68.2%
060750610001008	95	5	90	94.7%
060750610001009	77	15	62	80.5%
060750610001010	76	3	73	96.1%
060750610002001	294	66	228	77.6%
060750610002002	102	4	98	96.1%
060750610002003	61	3	58	95.1%
060750610002004	176	9	167	94.9%
060750610002005	3	0	3	100.0%
060750610002006	8	2	6	75.0%
060750610002007	1	0	1	100.0%
060750610002010	108	4	104	96.3%
060750610002011	83	4	79	95.2%
060750610002012	136	8	128	94.1%
060750610002013	90	13	77	85.6%
060750610002014	86	6	80	93.0%
060750610002015	76	9	67	88.2%
060750610002016	162	12	150	92.6%
060750610002017	225	37	188	83.6%
060816001001001	22	16	6	27.3%
060816001001002	37	21	16	43.2%
060816001001003	23	16	7	30.4%
060816001001004	68	47	21	30.9%
060816001001005	77	31	46	59.7%
060816001001006	670	400	270	40.3%
060816001001007	51	36	15	29.4%
060816001001008	104	72	32	30.8%
060816001001009	170	100	70	41.2%
060816001001010	54	46	8	14.8%
060816001001011	180	129	51	28.3%
060816001001012	154	99	55	35.7%
060816001001013	92	61	31	33.7%
060816001001014	23	19	4	17.4%
060816001001015	60	27	33	55.0%
060816001001016	13	6	7	53.8%
060816001001017	16	16	0	0.0%
060816001002000	51	33	18	35.3%
060816001002001	38	25	13	34.2%
060816001002002	72	44	28	38.9%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060816001002003	63	58	5	7.9%
060816001002004	66	51	15	22.7%
060816001002005	81	57	24	29.6%
060816001002006	48	31	17	35.4%
060816001002007	87	71	16	18.4%
060816001002008	32	28	4	12.5%
060816001002009	48	35	13	27.1%
060816001002010	29	20	9	31.0%
060816001002011	77	61	16	20.8%
060816001002012	161	106	55	34.2%
060816001002013	142	99	43	30.3%
060816001002014	26	15	11	42.3%
060816001003012	149	87	62	41.6%
060816001003013	198	112	86	43.4%
060816001003014	5	0	5	100.0%
060816001003015	91	40	51	56.0%
060816001003031	234	163	71	30.3%
060816001003043	85	51	34	40.0%
060816002001000	246	24	222	90.2%
060816002001001	142	8	134	94.4%
060816002001002	181	4	177	97.8%
060816002001003	8	0	8	100.0%
060816002001004	29	0	29	100.0%
060816002001005	142	0	142	100.0%
060816002001006	20	0	20	100.0%
060816002001007	608	27	581	95.6%
060816002001009	173	7	166	96.0%
060816002001012	17	2	15	88.2%
060816002001013	135	22	113	83.7%
060816002001014	74	13	61	82.4%
060816002001015	53	5	48	90.6%
060816002002000	19	2	17	89.5%
060816002002001	266	14	252	94.7%
060816002002002	27	0	27	100.0%
060816002002003	43	4	39	90.7%
060816002002004	44	3	41	93.2%
060816002002006	263	8	255	97.0%
060816002002007	122	9	113	92.6%
060816002002008	141	15	126	89.4%
060816002002009	29	4	25	86.2%
060816002002010	208	10	198	95.2%
060816002002011	193	11	182	94.3%
060816002002012	191	25	166	86.9%
060816002002013	154	25	129	83.8%
060816002002014	158	24	134	84.8%
060816002002015	204	20	184	90.2%
060816003001000	78	41	37	47.4%
060816003001001	214	59	155	72.4%
060816003001002	273	67	206	75.5%
060816003001003	38	7	31	81.6%
060816003001005	15	2	13	86.7%
060816003001006	16	14	2	12.5%
060816003001007	253	80	173	68.4%
060816003001008	245	41	204	83.3%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060816003001009	52	14	38	73.1%
060816003001011	24	3	21	87.5%
060816003001012	80	15	65	81.3%
060816003001013	38	6	32	84.2%
060816003001015	171	46	125	73.1%
060816003001016	53	11	42	79.2%
060816003001017	139	70	69	49.6%
060816003001018	118	44	74	62.7%
060816003001019	9	2	7	77.8%
060816003001020	14	8	6	42.9%
060816003002000	238	37	201	84.5%
060816003002001	46	1	45	97.8%
060816003002002	20	3	17	85.0%
060816003002003	30	8	22	73.3%
060816003002004	215	27	188	87.4%
060816003002005	6	3	3	50.0%
060816003002006	393	110	283	72.0%
060816003002007	2	0	2	100.0%
060816003002008	17	1	16	94.1%
060816003002009	18	6	12	66.7%
060816003002011	348	98	250	71.8%
060816003002016	114	5	109	95.6%
060816003002017	323	22	301	93.2%
060816003002018	171	16	155	90.6%
060816004001000	510	97	413	81.0%
060816004001001	157	17	140	89.2%
060816004001002	156	29	127	81.4%
060816004001003	27	13	14	51.9%
060816004001004	227	100	127	55.9%
060816004001006	792	121	671	84.7%
060816004001007	11	5	6	54.5%
060816004001009	32	11	21	65.6%
060816004001010	14	4	10	71.4%
060816004001011	18	6	12	66.7%
060816004001012	15	1	14	93.3%
060816004001014	78	37	41	52.6%
060816004001015	45	19	26	57.8%
060816004001016	43	4	39	90.7%
060816004001017	147	10	137	93.2%
060816004001018	140	10	130	92.9%
060816004001019	2	0	2	100.0%
060816004001020	42	1	41	97.6%
060816004001021	214	22	192	89.7%
060816004002000	234	19	215	91.9%
060816004002002	140	20	120	85.7%
060816004002003	107	4	103	96.3%
060816004002004	140	12	128	91.4%
060816004002005	203	10	193	95.1%
060816004002006	168	21	147	87.5%
060816004002007	152	23	129	84.9%
060816004002008	58	1	57	98.3%
060816004002009	143	11	132	92.3%
060816004003000	262	17	245	93.5%
060816004003001	263	13	250	95.1%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060816004003002	196	14	182	92.9%
060816004003003	200	16	184	92.0%
060816004003004	178	15	163	91.6%
060816004003005	25	0	25	100.0%
060816004003006	131	19	112	85.5%
060816004003007	49	8	41	83.7%
060816004003008	131	13	118	90.1%
060816004003009	160	21	139	86.9%
060816004003010	184	16	168	91.3%
060816004003011	220	20	200	90.9%
060816004003012	251	28	223	88.8%
060816004004000	228	9	219	96.1%
060816004004001	249	23	226	90.8%
060816004004002	117	5	112	95.7%
060816004004004	273	19	254	93.0%
060816004004005	104	8	96	92.3%
060816004004006	199	10	189	95.0%
060816004004007	171	16	155	90.6%
060816004004008	232	15	217	93.5%
060816004004009	221	20	201	91.0%
060816004004010	231	4	227	98.3%
060816005001000	410	94	316	77.1%
060816005001003	356	15	341	95.8%
060816005001004	15	0	15	100.0%
060816005001005	219	7	212	96.8%
060816005001006	198	7	191	96.5%
060816005001007	150	4	146	97.3%
060816005001008	212	19	193	91.0%
060816005001009	558	77	481	86.2%
060816005001010	256	15	241	94.1%
060816005002000	155	17	138	89.0%
060816005002001	161	22	139	86.3%
060816005002002	278	12	266	95.7%
060816005002003	206	20	186	90.3%
060816005002005	46	12	34	73.9%
060816005002006	83	7	76	91.6%
060816005003000	70	3	67	95.7%
060816005003001	115	22	93	80.9%
060816005003002	43	11	32	74.4%
060816005003007	147	11	136	92.5%
060816005003008	128	12	116	90.6%
060816005003009	135	7	128	94.8%
060816005003010	103	0	103	100.0%
060816005003011	162	19	143	88.3%
060816005003012	139	21	118	84.9%
060816005003013	165	25	140	84.8%
060816005003014	119	29	90	75.6%
060816005004000	774	167	607	78.4%
060816005004001	196	81	115	58.7%
060816005004002	87	4	83	95.4%
060816005005000	1118	71	1047	93.6%
060816005005001	257	41	216	84.0%
060816005005002	75	10	65	86.7%
060816005005003	43	13	30	69.8%

Block Group	Population	Non Hispanic White	Minority	Percent Minority
060816005005004	171	11	160	93.6%
060816005005005	131	24	107	81.7%
060816006001000	35	19	16	45.7%
060816006001001	243	7	236	97.1%
060816006001002	258	30	228	88.4%
060816006001003	239	28	211	88.3%
060816006001004	211	19	192	91.0%
060816006001005	226	17	209	92.5%
060816006001006	330	16	314	95.2%
060816006001008	444	45	399	89.9%
060816006002000	307	28	279	90.9%
060816006002001	244	32	212	86.9%
060816006002002	212	18	194	91.5%
060816006002003	45	17	28	62.2%
060816006002005	2	0	2	100.0%
060816006002006	80	5	75	93.8%
060816006002007	177	18	159	89.8%
060816006002008	205	11	194	94.6%
060816006002009	194	20	174	89.7%
060816006002010	201	10	191	95.0%
060816006002011	226	17	209	92.5%
060816006002012	61	0	61	100.0%
060816006002013	597	63	534	89.4%
060816006002014	257	18	239	93.0%
060816007001000	11	2	9	81.8%
060816007001001	117	16	101	86.3%
060816007001002	160	21	139	86.9%
060816007001003	83	11	72	86.7%
060816007001004	75	5	70	93.3%
060816007001005	92	3	89	96.7%
060816007001006	73	6	67	91.8%
060816007001007	5	0	5	100.0%
060816007002000	107	6	101	94.4%
060816007002001	158	8	150	94.9%
060816007002002	278	16	262	94.2%
060816007002003	166	18	148	89.2%
060816007002004	211	15	196	92.9%
060816007002005	214	16	198	92.5%
060816007002006	167	14	153	91.6%
060816007002007	127	14	113	89.0%
060816007002008	150	15	135	90.0%
060816007002009	240	18	222	92.5%
060816007003000	13	3	10	76.9%
060816007003002	130	2	128	98.5%
060816007003003	143	8	135	94.4%
060816007003004	147	6	141	95.9%
060816007003005	63	6	57	90.5%
060816007003006	277	38	239	86.3%
060816007004000	254	21	233	91.7%
060816007004001	235	10	225	95.7%
060816007004002	311	14	297	95.5%
060816007004003	189	30	159	84.1%
060816007004004	127	15	112	88.2%
060816007004005	248	12	236	95.2%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060816007004006	204	31	173	84.8%
060816007004007	299	26	273	91.3%
060816007005000	225	7	218	96.9%
060816007005001	304	25	279	91.8%
060816007005002	79	6	73	92.4%
060816007005006	156	11	145	92.9%
060816007005010	58	8	50	86.2%
060816007005011	137	7	130	94.9%
060816007006000	210	9	201	95.7%
060816007006001	29	0	29	100.0%
060816007006002	90	8	82	91.1%
060816007006003	274	37	237	86.5%
060816007006004	357	44	313	87.7%
060816007006005	245	24	221	90.2%
060816007006006	107	11	96	89.7%
060816007006007	142	16	126	88.7%
060816007006008	107	6	101	94.4%
060816007006009	33	0	33	100.0%
060816007006010	216	10	206	95.4%
060816008003002	547	148	399	72.9%
060816008003003	901	204	697	77.4%
060816009001002	571	310	261	45.7%

Block Group	Popu-lation	Non Hispanic White	Minority	Percent Minority
060816009001005	172	73	99	57.6%
060816009001006	50	31	19	38.0%
060816009001007	110	43	67	60.9%
060816016012003	118	69	49	41.5%
060816016012004	221	121	100	45.2%
060816016012005	8	4	4	50.0%
060816016012006	73	44	29	39.7%
060816016012007	82	48	34	41.5%
060816016012008	97	56	41	42.3%
060816016012009	53	25	28	52.8%
060816016012010	81	39	42	51.9%
060816016012011	51	38	13	25.5%
060816016012012	71	37	34	47.9%
060816016012013	46	22	24	52.2%
060816016012014	48	32	16	33.3%
060816016012016	77	39	38	49.4%
060816016012017	22	5	17	77.3%
TOTALS	**788674**	**333633**	**455041**	**57.7%**

Note: Census blocks with no population are not included.

2000 Census Low-income Population by Block SFERP 6-Mile Radius

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750604001	1469	105	7.15%
060750331004	600	7	1.17%
060750331003	781	34	4.35%
060750353004	843	99	11.74%
060750353003	1030	113	10.97%
060750353002	1385	27	1.95%
060750353001	1093	88	8.05%
060750330004	1031	19	1.84%
060750330006	1156	87	7.53%
060750330005	1334	28	2.10%
060750329007	1317	146	11.09%
060750329006	1223	12	0.98%
060750329005	1208	58	4.80%
060816016012	1065	72	6.76%
060816020001	2306	99	4.29%
060816012001	2596	358	13.79%
060816009001	1964	107	5.45%
060816008003	1939	402	20.73%
060750332022	2196	191	8.70%
060816006002	2822	167	5.92%
060816006001	2688	275	10.23%
060816005003	1556	67	4.31%
060816005002	933	31	3.32%
060816005001	2354	65	2.76%
060816007004	1775	227	12.79%
060816007005	922	130	14.10%
060816007003	704	91	12.93%
060816007006	1841	198	10.76%
060750313003	1808	108	5.97%
060750313004	1289	128	9.93%
060750262005	1111	64	5.76%
060816005005	1705	116	6.80%
060816007001	530	86	16.23%
060816005004	1118	124	11.09%
060816007002	1969	115	5.84%
060816004003	2217	76	3.43%
060750314003	1319	83	6.29%
060750314004	1173	222	18.93%
060750262004	1368	63	4.61%
060750332025	1269	142	11.19%
060750332024	721	175	24.27%
060750332023	2010	180	8.96%
060750332011	1759	549	31.21%
060750332021	1057	112	10.60%
060750309007	964	26	2.70%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750309006	645	90	13.95%
060750331002	996	56	5.62%
060750330003	1401	56	4.00%
060750330002	1071	74	6.91%
060750330001	1296	55	4.24%
060750328003	1358	78	5.74%
060750328004	1243	61	4.91%
060750331001	615	21	3.41%
060750308004	1503	29	1.93%
060750328002	1684	240	14.25%
060750304005	829	64	7.72%
060750308005	1789	39	2.18%
060750304004	802	72	8.98%
060750313005	1402	93	6.63%
060750313006	1055	158	14.98%
060750313002	1395	236	16.92%
060750313001	1231	71	5.77%
060750309003	1266	31	2.45%
060750309004	991	56	5.65%
060750309005	703	80	11.38%
060750309002	1303	104	7.98%
060750312006	973	63	6.47%
060750314005	1320	68	5.15%
060750312005	727	77	10.59%
060750314001	706	41	5.81%
060750312002	1362	114	8.37%
060750312004	1423	62	4.36%
060750312003	2439	195	8.00%
060750310003	1527	61	3.99%
060750310002	1181	30	2.54%
060750310001	838	29	3.46%
060750308003	778	27	3.47%
060750309001	899	6	0.67%
060750304003	1437	97	6.75%
060750304002	1124	59	5.25%
060750308001	861	38	4.41%
060750308002	715	29	4.06%
060750306003	813	28	3.44%
060750306002	628	20	3.18%
060750306001	715	0	0.00%
060816004002	1373	111	8.08%
060816004004	2014	182	9.04%
060750262003	1406	195	13.87%
060750314002	1534	153	9.97%
060750262002	1235	37	3.00%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750262001	1800	48	2.67%
060816004001	2632	162	6.16%
060750263031	4440	381	8.58%
060750263013	937	33	3.52%
060750263012	2286	320	14.00%
060816003001	1777	40	2.25%
060816003002	1983	66	3.33%
060750263022	1150	42	3.65%
060750263021	1138	21	1.85%
060750263011	1132	89	7.86%
060750263023	2067	46	2.23%
060750312001	1481	42	2.84%
060750261003	1046	96	9.18%
060750311003	669	23	3.44%
060750311004	1359	134	9.86%
060750311005	1794	43	2.40%
060750261002	2319	184	7.93%
060750261004	1143	139	12.16%
060750261001	1418	162	11.42%
060750311002	1496	150	10.03%
060750255005	1249	149	11.93%
060750255006	1930	249	12.90%
060750307003	2211	152	6.87%
060750307001	2554	111	4.35%
060750307002	1581	51	3.23%
060750217001	3070	182	5.93%
060750216002	2092	147	7.03%
060750260041	2192	137	6.25%
060750260042	1778	189	10.63%
060750260032	2674	284	10.62%
060750260012	2850	245	8.60%
060750255004	1005	106	10.55%
060750255003	899	121	13.46%
060750260011	2652	186	7.01%
060750255002	1068	118	11.05%
060750260031	2152	153	7.11%
060750260021	1581	233	14.74%
060750256004	1612	208	12.90%
060750260022	1663	176	10.58%
060750256001	1742	75	4.31%
060750311001	948	12	1.27%
060750217002	1069	48	4.49%
060750218004	948	62	6.54%
060750216001	1788	74	4.14%
060750255001	1317	20	1.52%
060750218003	688	105	15.26%
060750218002	1070	50	4.67%
060750254031	1610	83	5.16%
060750254013	1374	102	7.42%
060750254011	1624	410	25.25%
060750215004	1065	50	4.69%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750218001	1174	45	3.83%
060750215003	772	7	0.91%
060750215005	955	43	4.50%
060750214002	1396	37	2.65%
060750253003	900	142	15.78%
060750215002	1316	90	6.84%
060750215001	1070	49	4.58%
060816001002	1067	80	7.50%
060816001001	1696	91	5.37%
060816001003	1017	30	2.95%
060816002002	2182	152	6.97%
060750605023	1559	257	16.48%
060750605022	933	575	61.63%
060750605021	893	435	48.71%
060750264041	1586	95	5.99%
060750264042	845	115	13.61%
060750264011	1885	164	8.70%
060816002001	1700	215	12.65%
060750264012	1834	281	15.32%
060750264031	2024	186	9.19%
060750264032	1908	128	6.71%
060750264022	1557	81	5.20%
060750610002	1690	214	12.66%
060750605011	357	0	0.00%
060750256003	1105	59	5.34%
060750256002	1224	16	1.31%
060750259001	2061	149	7.23%
060750257006	1290	67	5.19%
060750264023	1639	247	15.07%
060750264021	884	22	2.49%
060750259002	1676	175	10.44%
060750257005	1366	192	14.06%
060750257004	1213	108	8.90%
060750257002	1879	176	9.37%
060750254032	2795	320	11.45%
060750254012	905	92	10.17%
060750254021	1054	18	1.71%
060750253002	814	65	7.99%
060750253001	942	80	8.49%
060750253004	1869	193	10.33%
060750252004	1088	46	4.23%
060750252003	1401	168	11.99%
060750252002	1527	124	8.12%
060750252001	1432	235	16.41%
060750254023	1239	18	1.45%
060750257001	2121	310	14.62%
060750254022	964	156	16.18%
060750251003	822	78	9.49%
060750251002	938	80	8.53%
060750251001	1452	197	13.57%
060750259003	568	10	1.76%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750258001	1045	125	11.96%
060750258002	763	51	6.68%
060750257003	1315	52	3.95%
060750233001	2446	310	12.67%
060750234002	2195	458	20.87%
060750230032	1212	220	18.15%
060750234003	184	80	43.48%
060750232005	709	92	12.98%
060750232004	1114	164	14.72%
060750230012	2997	340	11.34%
060750230011	2010	170	8.46%
060750230031	2650	88	3.32%
060750609001	60	11	18.33%
060750230021	2443	529	21.65%
060750610001	847	31	3.66%
060750234001	1068	433	40.54%
060750232003	1070	245	22.90%
060750232001	496	75	15.12%
060750232002	1029	175	17.01%
060750231021	3483	793	22.77%
060750231011	1223	307	25.10%
060750609002	98	10	10.20%
060750231031	4615	2392	51.83%
060750606001	565	110	19.47%
060750351007	1307	83	6.35%
060750351006	856	148	17.29%
060750351005	964	12	1.24%
060750351003	1230	122	9.92%
060750351002	1295	117	9.03%
060750351001	1244	19	1.53%
060750351004	850	52	6.12%
060750329004	1127	97	8.61%
060750329003	1135	20	1.76%
060750329002	1308	114	8.72%
060750329001	1104	89	8.06%
060750327005	821	150	18.27%
060750327006	722	99	13.71%
060750327007	745	116	15.57%
060750327004	758	28	3.69%
060750327003	1184	201	16.98%
060750327002	1295	87	6.72%
060750327001	973	48	4.93%
060750478003	1115	31	2.78%
060750478005	1521	207	13.61%
060750478002	1269	71	5.59%
060750478004	1234	12	0.97%
060750478001	1803	83	4.60%
060750427002	1831	137	7.48%
060750427003	1879	209	11.12%
060750428003	778	84	10.80%
060750428002	1130	38	3.36%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750328006	1195	170	14.23%
060750328005	1313	77	5.86%
060750326005	1268	86	6.78%
060750326006	1710	46	2.69%
060750326004	1229	139	11.31%
060750326003	1504	87	5.78%
060750326002	1389	78	5.62%
060750326001	1616	172	10.64%
060750328001	1201	112	9.33%
060750303023	1163	66	5.67%
060750303021	1173	80	6.82%
060750303014	1123	51	4.54%
060750303011	1239	105	8.47%
060750302013	1156	125	10.81%
060750302012	952	152	15.97%
060750302011	1865	70	3.75%
060750603001	73	9	12.33%
060750477023	1318	41	3.11%
060750477021	1254	68	5.42%
060750477013	1466	128	8.73%
060750477011	1547	242	15.64%
060750477022	1364	120	8.80%
060750477012	1605	108	6.73%
060750476004	1633	158	9.68%
060750476003	1027	55	5.36%
060750476002	1334	52	3.90%
060750476001	1437	162	11.27%
060750426003	1060	96	9.06%
060750303022	966	31	3.21%
060750304001	973	63	6.47%
060750303013	1538	127	8.26%
060750303012	1931	130	6.73%
060750302023	1353	146	10.79%
060750302022	1558	139	8.92%
060750302021	1527	157	10.28%
060750301014	882	100	11.34%
060750301013	989	151	15.27%
060750301022	1257	59	4.69%
060750305003	1314	274	20.85%
060750301012	1206	198	16.42%
060750301021	2610	244	9.35%
060750301011	1324	98	7.40%
060750452003	1033	63	6.10%
060750452004	1059	54	5.10%
060750452005	1262	101	8.00%
060750452002	1624	126	7.76%
060750452001	1690	227	13.43%
060750451003	1564	128	8.18%
060750451002	1338	89	6.65%
060750451001	2200	190	8.64%
060750156002	1183	140	11.83%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750156003	830	90	10.84%
060750156001	763	83	10.88%
060750427001	1783	124	6.95%
060750426004	1578	175	11.09%
060750426005	2221	89	4.01%
060750428001	660	5	0.76%
060750426002	1282	48	3.74%
060750426001	1059	123	11.61%
060750402002	940	133	14.15%
060750402003	1341	99	7.38%
060750402004	1363	75	5.50%
060750402001	1693	57	3.37%
060750401004	852	47	5.52%
060750601001	2236	387	17.31%
060750401003	1336	128	9.58%
060750401002	1095	142	12.97%
060750401001	934	64	6.85%
060750154005	1658	119	7.18%
060750133005	633	15	2.37%
060750133004	827	9	1.09%
060750305002	751	12	1.60%
060750204003	2207	134	6.07%
060750305001	857	24	2.80%
060750171004	591	29	4.91%
060750301023	861	16	1.86%
060750171005	1247	72	5.77%
060750171003	980	18	1.84%
060750213002	1353	58	4.29%
060750212002	1148	44	3.83%
060750204002	1838	145	7.89%
060750212003	894	71	7.94%
060750204004	621	0	0.00%
060750204005	917	35	3.82%
060750170003	813	57	7.01%
060750204001	1148	69	6.01%
060750170002	1988	129	6.49%
060750171006	1864	217	11.64%
060750166003	1089	164	15.06%
060750166004	1468	84	5.72%
060750166002	1029	73	7.09%
060750165004	967	80	8.27%
060750157004	1009	212	21.01%
060750157003	1605	208	12.96%
060750165003	1344	86	6.40%
060750165002	1164	292	25.09%
060750171002	1212	70	5.78%
060750171001	1349	184	13.64%
060750166001	1406	98	6.97%
060750167003	813	65	8.00%
060750167004	1330	174	13.08%
060750165001	1408	210	14.91%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750157002	1730	249	14.39%
060750157001	1035	26	2.51%
060750164002	1362	183	13.44%
060750158004	1326	130	9.80%
060750158003	1603	189	11.79%
060750213001	1079	42	3.89%
060750212001	810	41	5.06%
060750211003	935	88	9.41%
060750214003	1145	98	8.56%
060750211004	861	36	4.18%
060750205003	860	49	5.70%
060750205002	901	108	11.99%
060750205001	793	64	8.07%
060750206003	980	49	5.00%
060750206004	1418	102	7.19%
060750203003	1141	87	7.62%
060750214001	738	65	8.81%
060750211002	834	97	11.63%
060750211001	1220	37	3.03%
060750210003	1486	91	6.12%
060750210004	1012	226	22.33%
060750210002	968	51	5.27%
060750210001	1065	182	17.09%
060750207003	948	42	4.43%
060750206002	766	9	1.17%
060750206001	1605	161	10.03%
060750203002	613	22	3.59%
060750207002	2104	124	5.89%
060750207001	2375	241	10.15%
060750202003	2626	644	24.52%
060750170001	974	78	8.01%
060750169002	1056	64	6.06%
060750167002	684	23	3.36%
060750167001	1874	169	9.02%
060750169001	1877	151	8.04%
060750168006	980	105	10.71%
060750168005	1265	105	8.30%
060750164001	2228	357	16.02%
060750158002	1674	581	34.71%
060750163003	2238	391	17.47%
060750161002	1545	249	16.12%
060750161004	1404	376	26.78%
060750203001	1370	157	11.46%
060750168003	767	64	8.34%
060750202002	2196	399	18.17%
060750202001	1359	95	6.99%
060750168002	924	97	10.50%
060750168004	1369	447	32.65%
060750163002	1127	206	18.28%
060750163001	1063	221	20.79%
060750161003	1379	371	26.90%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750162003	907	208	22.93%
060750168001	779	84	10.78%
060750162002	929	85	9.15%
060750161001	919	133	14.47%
060750162001	709	53	7.48%
060750154004	744	38	5.11%
060750154003	1309	49	3.74%
060750133003	747	57	7.63%
060750133002	1162	28	2.41%
060750154001	651	30	4.61%
060750133001	776	32	4.12%
060750154002	1300	110	8.46%
060750134002	1440	114	7.92%
060750155003	716	240	33.52%
060750158005	1654	305	18.44%
060750153002	1013	59	5.82%
060750134003	1382	53	3.84%
060750132003	1456	45	3.09%
060750128003	917	17	1.85%
060750128002	794	7	0.88%
060750127003	801	32	4.00%
060750127002	1173	40	3.41%
060750128004	770	62	8.05%
060750127001	1523	69	4.53%
060750128001	1728	60	3.47%
060750126002	2369	71	3.00%
060750126003	1447	20	1.38%
060750158001	542	64	11.81%
060750155002	1248	202	16.19%
060750153001	893	76	8.51%
060750152003	694	95	13.69%
060750159002	2166	521	24.05%
060750152002	1340	40	2.99%
060750134001	790	64	8.10%
060750132002	817	22	2.69%
060750130004	950	36	3.79%
060750135002	1402	129	9.20%
060750135001	1314	48	3.65%
060750132001	2163	80	3.70%
060750130003	997	45	4.51%
060750159001	1909	204	10.69%
060750155001	1646	102	6.20%
060750152001	1734	188	10.84%
060750160001	1983	196	9.88%
060750151001	1506	138	9.16%
060750151002	780	69	8.85%
060750131003	1452	95	6.54%
060750131004	1340	89	6.64%
060750130002	988	9	0.91%
060750131002	1848	95	5.14%
060750131001	1676	127	7.58%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750129005	824	52	6.31%
060750129004	993	31	3.12%
060750126001	1099	86	7.83%
060750129003	1313	60	4.57%
060750130001	1195	63	5.27%
060750129002	1297	21	1.62%
060750129001	1279	47	3.67%
060750109003	1579	130	8.23%
060750102002	1976	74	3.74%
060750102003	1025	37	3.61%
060750209003	736	117	15.90%
060750209004	1197	142	11.86%
060750209001	2048	309	15.09%
060750208004	1993	342	17.16%
060750209002	1076	296	27.51%
060750229013	1227	150	12.22%
060750229011	1986	347	17.47%
060750228031	1905	403	21.15%
060750208003	1548	329	21.25%
060750208002	2259	472	20.89%
060750208001	1548	341	22.03%
060750201004	2220	555	25.00%
060750228013	1883	300	15.93%
060750229012	1696	316	18.63%
060750229022	1364	221	16.20%
060750229021	1547	301	19.46%
060750228032	3179	713	22.43%
060750229033	1201	204	16.99%
060750229031	1531	174	11.37%
060750228012	1940	311	16.03%
060750228011	721	158	21.91%
060750228022	931	117	12.57%
060750228021	741	35	4.72%
060750201002	1577	615	39.00%
060750201003	1615	175	10.84%
060750201001	907	101	11.14%
060750177002	1580	289	18.29%
060750124004	712	106	14.89%
060750176014	267	43	16.10%
060750124003	935	367	39.25%
060750177001	172	0	0.00%
060750180002	635	184	28.98%
060750178004	676	109	16.12%
060750176013	1873	445	23.76%
060750176012	3215	937	29.14%
060750178003	2585	518	20.04%
060750229032	1210	112	9.26%
060750227033	2320	637	27.46%
060750227031	1106	152	13.74%
060750227013	377	7	1.86%
060750227012	1685	85	5.04%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750227011	628	24	3.82%
060750227032	1714	427	24.91%
060750227022	1004	14	1.39%
060750227021	815	7	0.86%
060750226003	97	0	0.00%
060750607002	14	0	0.00%
060750178002	1501	247	16.46%
060750180001	445	30	6.74%
060750607001	178	10	5.62%
060750607003	318	89	27.99%
060750122003	2249	592	26.32%
060750124005	1472	569	38.65%
060750120002	1907	387	20.29%
060750120001	1908	349	18.29%
060750111003	779	101	12.97%
060750124001	1706	400	23.45%
060750122002	2076	287	13.82%
060750124002	2838	744	26.22%
060750122001	2710	556	20.52%
060750121001	2557	396	15.49%
060750111001	2274	311	13.68%
060750110003	2105	114	5.42%
060750111002	2275	251	11.03%
060750110001	872	146	16.74%
060750109002	1753	87	4.96%
060750110002	2052	269	13.11%
060750119003	1422	195	13.71%
060750112002	1287	53	4.12%
060750108003	1981	133	6.71%
060750108002	1786	284	15.90%
060750125003	2638	872	33.06%
060750125001	3832	1261	32.91%
060750125002	1146	349	30.45%
060750123001	3032	598	19.72%
060750123002	3173	1105	34.83%
060750121002	888	175	19.71%
060750176011	366	263	71.86%
060750117002	960	315	32.81%
060750119001	1586	165	10.40%
060750112003	790	17	2.15%
060750119002	2197	281	12.79%
060750112001	1623	137	8.44%
060750113001	1727	376	21.77%
060750113002	1537	268	17.44%
060750118001	1551	264	17.02%
060750107003	1649	413	25.05%
060750114002	1977	489	24.73%
060750114001	1194	268	22.45%
060750109001	1174	49	4.17%

Block Group	Population w/poverty status	Income below poverty level	% low-income
060750102001	1287	64	4.97%
060750103003	1205	63	5.23%
060750108001	1330	117	8.80%
060750103002	1344	68	5.06%
060750103001	1538	102	6.63%
060750107001	950	0	0.00%
060750107002	3029	759	25.06%
060750104001	691	163	23.59%
060750104002	1694	167	9.86%
060750101002	2233	325	14.55%
060750106003	1382	294	21.27%
060750106001	1534	157	10.23%
060750104003	1631	39	2.39%
060750101001	641	49	7.64%
060750178001	960	345	35.94%
060750176022	22	22	100.00%
060750117001	734	202	27.52%
060750115001	763	180	23.59%
060750179013	1118	257	22.99%
060750179014	212	13	6.13%
060750179012	2449	581	23.72%
060750179011	1629	189	11.60%
060750176021	313	38	12.14%
060750105002	1650	97	5.88%
060750106002	1300	239	18.38%
060750104004	843	47	5.58%
060750105001	628	29	4.62%
060750226002	453	32	7.06%
060750226001	389	23	5.91%
060750179021	1447	380	26.26%
060014275001	356	28	7.87%
060014019002	0	0	#DIV/0!
060014020001	25	5	20.00%
060014019001	797	55	6.90%
060014018002	959	377	39.31%
060014022002	931	391	42.00%
060014017002	854	315	36.89%
060014017003	97	29	29.90%
060014277003	1441	76	5.27%
060014277002	2032	159	7.82%
060014276002	941	152	16.15%
060014277004	791	69	8.72%
060014276001	4094	651	15.90%
060014286002	652	67	10.28%
060014277001	847	53	6.26%
060014274002	1200	29	2.42%
TOTALS	**800564**	**90791**	**11.34%**

APPENDIX 8.8B

Records of Conversations with Public Service Providers

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To:	Matt Bamberger Business Representative		IBEW Local 6
Phone No.:	415-861-5752	**Date:**	January 5, 2004
Call From:	Fatuma Yusuf	**Time:**	3:35 PM
Message Taken By:			
Subject:	Availability of skilled labor in the San Francisco area		

I called the International Brotherhood of Electrical Workers (IBEW) Local 6 to find out whether the union had enough electricians to fill the jobs for the SFPUC SERP project. Matt Bamberger informed that there were tons of trained electricians. Currently there are over 400 electricians, 100 of them local and 300 nonlocal. Besides, the union can always call upon others within the local area or from outside the local area. Thus, he did not forsee any problems filling the jobs.

From: Jeff Fillingim-Selk [jfillin@muse.sfusd.edu]
Sent: January 14, 2004 1:17 PM
To: Yusuf, Fatuma/SAC
Subject: Current Enrollment Counts

Hello Fatuma,

Attached is a spreadsheet that approximates the form that you sent to Claudia Beliz. I hope that it is acceptable. I am working on providing you projection numbers. I should have some numbers or a status for you by tomorrow AM, if I don't please don't hesitate to contact me.

The data in the attached document are derived from the student file that was used to report the CBEDS numbers for the Fall, 2003.

I hope that this is helpful.

Peace,

Jeff Fillingim-Selk

Operations Manager, EPC

241-6029 (office)

241-6087 (fax)

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To:	Lt. Juarez		San Francisco Fire Department
Phone No.:	415-558-3225	**Date:**	January 5, 2004
Call From:	Fatuma Yusuf	**Time:**	10:47 AM
Message Taken By:			
Subject:	San Francisco Fire Department		

The closest station to the proposed project site is Station No. 25 which is located at 3501 3rd Street. Station No. 25 has one fire engine with one officer and 3 fire fighters. The next nearest station is Station No. 37, located at 798 Wisconsin. Station No. 37 has one fire engine with one officer and 3 fire fighters. The closest station after Station No. 37 is Station No. 9 which is located at 2245 Gerald Street. Station No. 9 has one engine company with 3 fire fighters, one truck company with one officer and 4 fire fighters and an ambulance.

Response time from Station No. 25 to a call from the project site is 3 and a half minutes. The response times from the other stations is within 3 to 5 minutes.

Currently, there is a lot of ongoing construction in San Francisco and the fire department has been able to meet the needs of the public. Thus, no impacts are anticipated during the construction (as well as operation) phase of the project.

Lt. Juarez asked that I confirm the above information with the chief's office (Chief Trevino). I called the chief's office several times (1/5/04, 1/6/04, 1/7/04, 1/8/04, 1/14/04, 1/13/04, 1/29/04) and even sent a fax on 1/5/04 that was addressed to Chief Mario Trevino. But I never received any feedback from the Chief's office.

MessageFrom: Justin Strong [justin@wwstar.com]
Sent: December 31, 2003 11:42 AM
To: Yusuf, Fatuma/SAC
Subject: RE: Number of hotel/motel rooms

This is the rate and occupancy for San Francisco County from November 2002 to November 2003.

ROOM RATE: $ 138.98
OCCUPANCY: 67.0 %

Let me know if this works.

-----Original Message-----
From: Fatuma.Yusuf@ch2m.com [mailto:Fatuma.Yusuf@ch2m.com]
Sent: Wednesday, December 31, 2003 1:39 PM
To: Justin Strong
Subject: RE: Number of hotel/motel rooms

How about for 2002? Do you happen to also have the vacancy rate for that period?

-----Original Message-----
From: Justin Strong [mailto:justin@wwstar.com]
Sent: December 31, 2003 11:37 AM
To: Yusuf, Fatuma/SAC
Subject: RE: Number of hotel/motel rooms

Are you looking for Year to date or running 12 month?

-----Original Message-----
From: Fatuma.Yusuf@ch2m.com [mailto:Fatuma.Yusuf@ch2m.com]
Sent: Wednesday, December 31, 2003 1:36 PM
To: Justin Strong
Subject: RE: Number of hotel/motel rooms

I forgot to ask in my last email. What year are the stats below for?

Thanks again,

Fatuma

-----Original Message-----
From: Justin Strong [mailto:justin@wwstar.com]
Sent: December 31, 2003 8:20 AM
To: Yusuf, Fatuma/SAC
Cc: Bobby Bowers
Subject: RE: Number of hotel/motel rooms

Fatuma,

We do not track city data in our normal processing, however we can offer you a trend with this info. for $300.

We do track county info. Numbers for San Francisco county are as follows :

Properties: 244
Rooms: 34832
ROOM RATE: $ 139.19

Let me know if you would like the trend or if I can help you with anything else.

Happy Holidays!

Justin

Original Message-----
From: Fatuma.Yusuf@ch2m.com [mailto:Fatuma.Yusuf@ch2m.com]
Sent: Tuesday, December 30, 2003 6:43 PM
To: Justin Strong
Subject: FW: Number of hotel/motel rooms

Hi Justin,

Can you help with this? Thank you so much for your help.

Fatuma

-----Original Message-----
From: Yusuf, Fatuma/SAC
Sent: December 30, 2003 4:41 PM
To: Bobby Bowers (bobby@wwstar.com)
Subject: Number of hotel/motel rooms

Hi Bobby,

Hope you are enjoying the Holidays. If you are able to help, I'd really appreciate it very much if you could send me the following information for the City and County of San Francisco:

Number of hotels/motels
Number of hotels/motel rooms
Average rate hotel/motel room rates.

Thanks and a Wonderful and Prosperous New Year.

Fatuma Yusuf, Ph.D.
Economist
CH2M HILL
2485 Natomas Park Dr. Suite 600
Sacramento, CA 95833-2937
Phone: 916.286.0479
Email: fyusuf@CH2M.com
Facys: 916.614.3484

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To:	Larry Lee Business Agent		Plumbers #38
Phone No.:	415-626-2000	**Date:**	January 6, 2004
Call From:	Larry Lee	**Time:**	10:20 AM
Message Taken By:	Fatuma Yusuf		
Subject:	Availability of skilled labor		

Larry Lee returned my call from earlier in the morning. He told that Plumbers #38 believes that there are adequate numbers of workers to meet the project needs.

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To:	Contact: Captain Mike Puccinelli San Francisco Police Department Bayview Station 201 Williams Avenue San Francisco, CA		
Phone No.:	415-671-2300	**Date:**	January 6, 2004
Call From:	Fatuma Yusuf	**Time:**	3:45 PM
Subject:	San Francisco Electric Reliability Project		

Captain Mike Puccinelli said that the Bayview station has approximately 100 sworn officers of which one is the captain, 4 are lieutenants, 16 are sergeants and the remaining are patrol officers. There are 5 patrol cars that patrol the 5 sectors served by the station. There are night and daytime patrols and there could be one or 2 officers in each patrol car.

The response time to an emergency call from the project site depends on the priority of the call. The SFPD uses a prioritization system whereby calls are categorized as either A, B or C. Calls categorized as 'A' are typically responded to within 2 minutes. 'A' types of calls are calls involving ongoing crimes or crimes in progress, e.g., burglary in progress, assault, shooting, stabbing, etc. Response times to 'B' calls are longer than 2 minutes whereas 'C' calls are responded to whenever. 'B' type of calls are those involving crimes that have already happened, e.g., a burglary has already occurred and the officer is required to take down a report. 'C' type of calls are those typically dealing with minor infractions.

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To:	Stan Warren Secretary/Treasurer		San Francisco Building Trades Council (BTC)
Phone No.:	415-467-3330	**Date:**	January 5, 2004
Call From:	Fatuma Yusuf	**Time:**	4:40 PM
Message Taken By:			
Subject:	Availability of skilled labor		

Stan Warren informed me that the BTC could probably supply all the labor requirements of the project. He, however, pointed he can only predict upto a year. If the project starts more than a year from now, he suggested that SFPUC should work closely with contractors.

APPENDIX 8.12A

Offsite Consequence Analysis

Off-Site Consequence Analysis

PREPARED FOR: John Carrier/CH2M HILL, Ralph Hollenbacher/SFPUC

PREPARED BY: William Heung/CH2M HILL, Stephen O'Kane/CH2M HILL

DATE: January 23, 2004

The San Francisco Public Utility Commission (SFPUC) is proposing to construct and operate a simple-cycle power plant, the San Francisco Electric Reliability Project (SFERP). The project site is located adjacent to the San Francisco Bay in the Potrero District of the City and County of San Francisco (CCSF) within the existing Potrero Power Plant (formerly owned by PG&E and now owned and operated by Mirant California). The SFERP will be located on a portion of the Unit 7 site.

The SFERP project will consist of a nominal 145-megawatt (MW) simple-cycle plant, using three natural gas-fired LM 6000 gas turbines and associated infrastructure. The project will include the construction of a new air insulated 115-kV switchyard on the west side of the site. A natural gas pipeline tie-in will be made to an existing PG&E-owned, natural gas, Gas Load Center, approximately 275 feet west of the project site. Water for the project would be delivered via a wastewater supply pipeline and treated on-site.

The SFPUC is required by both the Clean Air Act and the Bay Area Air Quality Management District (BAAQMD) to install Best Available Control Technology (BACT) to control emissions of criteria air pollutants from the combustion turbines. The project's turbines will incorporate water injection to reduce emissions of oxides of nitrogen (NO_X). Carbon monoxide (CO) and volatile organic compounds (VOC) emissions will be controlled using an oxidation catalyst system. In addition, emissions of NO_X from the turbines will be further reduced through the use of selective catalytic reduction (SCR). The SCR control system uses ammonia as the reduction reagent in the presence of a catalyst. Two forms of ammonia may be used in currently designed SCR systems, i.e., aqueous ammonia or anhydrous ammonia. SFPUC is proposing to use the less toxic form, aqueous ammonia.

SFPUC will store a 29-percent aqueous ammonia solution in a single stationary storage tank. The capacity of the tank will be approximately 12,000 gallons. The tank will be surrounded by a secondary containment structure capable of holding the full contents of the tank, approximately 665 square feet (38 feet by 17.5 feet). On the floor of the detention basin, is a drain line (24-inch diameter) that leads to a spill vault (6 feet by 14 feet by 18 feet).

Aqueous ammonia will be delivered to the plant by truck transport. The truck loading area will be located within a bermed area adjacent to the storage tank. The floor of the loading area will be sloped that will drain into the spill vault for the tank through a 4-inch drain line.

Additional Analysis

An additional analysis of a tank failure and subsequent release of aqueous ammonia was prepared. The analysis assumes the complete failure of the tank and the formation of an evaporating pool of aqueous ammonia within the secondary containment structure. For purposes of this analysis, the following meteorological data were used:

- U.S. Environmental Protection Agency (USEPA) default (worst case) meteorological data, supplemented by daily temperature data as required by 19 CCR 2750.2.

The SFERP will be located in the Potrero District, San Francisco, California. The maximum temperature recorded near the Potrero District (San Francisco International Airport) in the past 3 years was 97 °F or 309.26 Kelvin (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?casfoa+sfo). Maximum temperatures combined with low wind speeds and stable atmospheric conditions are expected to result in the highest modeled ammonia concentrations at the furthest distance downwind of the project site.

Table 1 displays the meteorological data values used in the modeling analysis.

TABLE 1
Meteorological Input Parameters

Parameter	Worst Case Meteorological Data
Wind Speed meters/second	1.5
Stability Class	F
Relative Humidity, Percent	50
Ambient Temperature, Kelvin (°F)	309.26 (97)

One modeling run was conducted, an evaporating pool release caused by a single tank failure, for the corresponding meteorological scenario listed in Table 1. Modeling was conducted using the SLAB numerical dispersion model. A complete description of the SLAB model is available in *User's Manual for SLAB: An Atmospheric Dispersion Model for Denser-Than-Air Releases, D. E. Ermak, Lawrence Livermore National Laboratory, June 1990.* The SLAB user manual contains a substance database, which includes chemical specific data for ammonia. This data was used in all modeling runs without exception or modification.

Emissions of aqueous ammonia were calculated pursuant to the guidance given in *RMP Offsite Consequence Analysis Guidance, EPA, April 1999* and using the "evaporation calculator" provided by the National Oceanic and Atmospheric Administration (http://response.restoration.noaa.gov/cameo/evapcalc/evap.html#). Release rates for ammonia vapor from an evaporating 29-percent solution of aqueous ammonia were calculated assuming mass transfer of ammonia across the liquid surface occurs according to principles of heat transfer by natural convection. The ammonia release rate was calculated using the evaporation calculator, meteorological data displayed in Table 1 and the dimensions of the secondary containment area.

An initial ammonia evaporation rate was calculated and assumed to occur for at least one hour. For concentrated solutions, the initial evaporation rate is substantially higher than the rate averaged over time periods of a few minutes or more since the concentration of the solution immediately begins to decrease as evaporation begins.

For the main storage tank scenario, the complete release of the storage tank contents (10,000 gallons of 29-percent aqueous ammonia) was assumed to be the worst case scenario. The failure of the tank would cause the aqueous ammonia to leak into the containment area and the release of ammonia will result from evaporation.

Although the edge of the tank containment area is raised above ground level, the release heights used in the modeling were set at 0 m above ground level (AGL) to maintain the conservative nature of the analysis. Downwind concentrations of ammonia were calculated at heights of 10, 5, and 1.6 meters above ground level and at 0 meters above ground. Reported distances to specified toxic endpoints are the maximum distances for concentrations at 0, 1.6, 5 or 10 meters above ground. The California Office of Environmental Health Hazard Assessment (OEHHA) has designated 1.6 meters as the breathing zone height for individuals. 5 and 10 meters correspond to the heights of a 2 and 3 story building, respectively.

An analysis of the tank loading hose failure with a leak below the excess flow valves activation set-point and the subsequent impacts was considered. This analysis would normally be completed under typical or average meteorological conditions for the area. However, after review of the possible failure modes, it was determined that the impact of this leak would be bracketed by the complete tank failure as a worst-case for the hose failure.

Toxic Effects of Ammonia

With respect to the assessment of potential impacts associated with an accidental release of ammonia, four offsite "bench mark" exposure levels are typically evaluated, as follows: (1) the lowest concentration posing a risk of lethality, 2,000 ppm; (2) the Occupational Safety and Health Administration's (OSHA) Immediately Dangerous to Life and Health (IDLH) level of 300 ppm; (3) the Emergency Response Planning Guideline (ERPG) level of 200 ppm, which is also the RMP level 1 criterion used by the USEPA and California [Note: in the year 2000 the American Industrial Hygiene Association (AIHA) updated the ERPG-2 for ammonia to 150 ppm]; and (4) the level considered by CEC staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm (*Preliminary Staff Assessment-Otay Mesa Generating Project, 99-AFC-5, May 2000)*.

The odor threshold of ammonia is about 5 ppm, and minor irritation of the nose and throat will occur at 30 to 50 ppm. Concentrations greater than 140 ppm will cause detectable effects on lung function even for short-term exposures (0.5 to 2 hours). At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death occurs at concentrations of 2,500 to 7,000 ppm.

The specified toxic endpoint (TE) value for ammonia is 0.14 mg/l, which is approximately equal to 200 ppm (*RMP Offsite Consequence Analysis Guidance, EPA, April 1999*). The TE value is based on a one-hour exposure or averaging time, therefore, the modeling concentrations at all offsite receptors will be given in terms of one-hour (or 60 minute) averaging time.

Modeling Results

Table 2 shows the distance to the lowest concentration posing a risk of lethality, (2,000 ppm), OSHA's IDLH (300 ppm), the EPA/CalARP toxic endpoint (200 ppm) and the CEC significance value (75 ppm) for the modeled release scenario. Figure 1 shows the facility and the distance to the 75 ppm, 200 ppm, 300 ppm, and 2,000 ppm modeled concentrations.

TABLE 2
Distance to EPA/CalARP and CEC Toxic Endpoints

Scenario	Distance in Meters to 2,000 ppm	Distance in Meters to IDHL of 300 ppm	Distance in Meters to EPA/CalARP TE of 200 ppm	Distance in Meters to CEC Significance Value, 75 ppm
0 m AGL	22.18	25.75	26.19	27.22
1.6 m AGL	25.79	29.72	30.13	31.13
5 m AGL	35.54	40.02	40.29	41.07
10 m AGL	51.72	54.01	54.15	58.77

The model input file and the output files are available upon request.

As shown by Figure 1, the distance to the CEC's extremely protective 75 ppm ammonia concentration extends just off the project site's eastern boundary, which is on the Mirant Potrero Power Plant site. Additionally, ammonia concentrations expected to occur to the north, south, and west boundaries would be significantly lower than 75 ppm due to the ammonia storage tanks location at the eastern side of the project site (further away from public and residential receptors) and the SFPUC's selection of the safer form of ammonia.

Assessment of the Methodology Used

Numerous conservative assumptions were used in the above analysis of the tank failure. These include the following:

- Modeling & Meteorology
  - Worse case of a constant mass flow, initial evaporation rate was modeled, whereas in reality the evaporation rate would decrease with time as the concentration in the solution decreases.
  - Worst case stability class was used, which almost exclusively occurs during nighttime hours, but the maximum ambient temperature of 97°F was used, which would occur during daylight hours.
  - Again worst-case meteorology corresponds to nighttime hours, whereas the worst-case release of a tank failure would most likely occur during daytime activities at the power plant. At night, activity at a power plant is typically minimal.

Risk Probability

Accidental releases of aqueous ammonia in industrial use situations are rare. Statistics compiled on the normalized accident rates for RMP chemicals for the years 1994-1999 from *Chemical Accident Risks in U.S. Industry-A Preliminary Analysis of Accident Risk Data from U.S. Hazardous Chemical Facilities, J.C. Belke, Sept 2000*, indicates that ammonia (all forms) averages 0.017 accidental releases per process per year, and 0.018 accidental releases per million pounds stored per year. Data derived from *The Center for Chemical Process Safety, 1989*, indicates the accidental release scenarios and probabilities for ammonia in general shown in Table 3.

TABLE 3
General Accidental Release Scenarios and Probabilities for Ammonia

Accident Scenario	Failure Probability
Onsite Truck Release	0.0000022
Loading Line Failure	0.005
Storage Tank Failure	0. 000095
Process Line Failure	0.00053
Evaporator Failure	0.00015

Conclusions

Several factors need to be considered when determining the potential risk from the use and storage of hazardous materials. These factors include population densities near the project site, meteorological conditions, and the process design. Considering the results of this analysis, the probability of a catastrophic storage tank failure resulting in the modeled ammonia concentrations, and the probability of a tank failure occurring under low wind speeds and F class atmospheric stability, the risk posed to the local community from the storage of aqueous ammonia at the SFPUC site is insignificant.

As described above, numerous conservative assumptions have been made at each step in the analysis. This compounding of conservative assumptions has resulted in a significant overestimation of the probability of an ammonia release at the SFERP and the predicted distances to toxic endpoints do not pose a threat to public receptors. Therefore, it is concluded that the risk from exposure to aqueous ammonia due to the SFERP is less than significant.

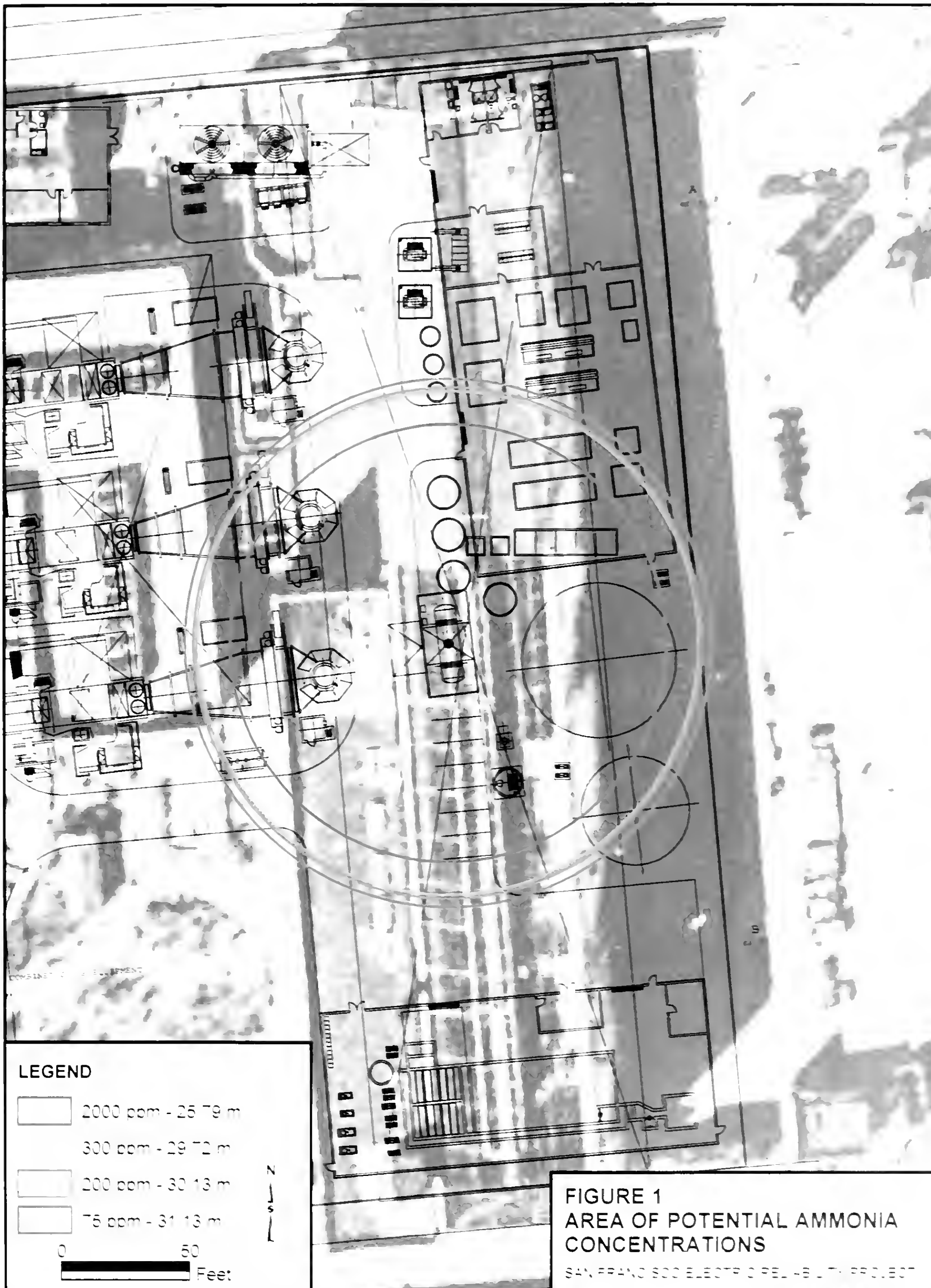

FIGURE 1
AREA OF POTENTIAL AMMONIA CONCENTRATIONS

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

CH2MHILL

APPENDIX 10A

Civil Engineering Design Criteria

APPENDIX 10A

Civil Engineering Design Criteria

10A.1 Introduction

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and construction of civil engineering systems. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

10A.2 Codes and Standards

The design of civil engineering systems for the project will be in accordance with the laws and regulations of the federal government, the State of California, the City and County of San Francisco industry standards. The current issue or edition of the documents at the time of filing of this Application for Certification (AFC) will apply, unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

10A.2.1 Civil Engineering Codes and Standards

The following codes and standards have been identified as applicable, in whole or in part, to civil engineering design and construction of power plants:

- American Association of State Highway and Transportation Officials (AASHTO)—Standards and Specifications
- American Concrete Institute (ACI)—Standards and Recommended Practices
- American Institute of Steel Construction (AISC)—Standards and Specifications
- American National Standards Institute (ANSI)—Standards
- American Society of Testing and Materials (ASTM)—Standards, Specifications and Recommended Practices
- American Water Works association (AWWA)—Standards and Specifications
- American Welding Society (AWS)—Codes and Standards
- Asphalt Institute (AI)—Asphalt Handbook
- California Building Code (CBC), 2001 (Based on Uniform Building Code [UBC], 1997)
- CEC—Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California, 1989
- Concrete Reinforcing Steel Institute (CRSI)—Standards

- Factory Mutual (FM)—Standards
- National Fire Protection Association (NFPA)—Standards
- Steel Structures Painting Council (SSPC)—Standards and Specifications

10A.2.2 Engineering Geology Codes, Standards and Certifications

Engineering geology activities will conform to the applicable federal, state and local laws, regulations, ordinances and industry codes and standards.

10A.2.2.1 Federal

None are applicable.

10A.2.2.2 State

The Warren-Alquist Act, PRC, Section 25000 et seq. and the CEC California Code of Regulations (CCR), Siting Regulations, Title 20 CCR, Chapter 2, require that an AFC address the geologic and seismic aspects of the project.

The California Environmental Quality Act (CEQA), PRC 21000 et seq. and the CEQA Guidelines require that potentially significant effects, including geologic hazards, be identified and a determination made as to whether they can be substantially reduced.

10A.2.2.3 Local

California State Planning Law, Government Code Section 65302, requires each city and county to adopt a general plan, consisting of nine mandatory elements, to guide its physical development. Section 65302(f) requires that a seismic safety element be included in the general plan.

The project development activities will require certification by a Professional Geotechnical Engineer and a Professional Engineering Geologist during and following construction, in accordance with the California Building Code (CBC), Chapter 33 and Appendix Chapter 33. The Professional Geotechnical Engineer and/or the Professional Engineering Geologist will certify the placement of earthen fills and the adequacy of the site for structural improvements, as follows:

- Both the Professional Geotechnical Engineer and the Professional Engineer will address CBC Appendix Chapter 33, Sections 3309 (Grading Permits), 3312 (Cuts), 3313 (Fills), 3315 (Terraces), 3316 (Erosion Control), and 3318 (Final Report).
- The Professional Geotechnical Engineer will also address CBC Appendix Chapter 33, Sections 3314 (Setbacks) and 3315 (Terraces).

Additionally, the Professional Engineering Geologist will present findings and conclusions pursuant to Public ResoBurces Code (PRC), Section 25523 (a) and (c); and 20 CCR, Section 1752 (b) and (c).

10A.2.3 Storm Drainage Codes, Standards and Certifications

Storm drainage design activities will conform to the applicable federal, state and local laws, regulations, ordinances and industry codes and standards. The design of all storm drainage will be performed by, or under the direct supervision of a licensed civil engineer.

10A.2.2.1 Federal

All finish floors shall be higher than the 100-year floodplain elevation as established by the Federal Emergency Management Agency (FEMA).

10A.2.2.2 State

None are applicable.

10A.2.2.3 Local

Both the City and County of San Francisco have specific design requirements for stormwater management design that will be met by this project.

APPENDIX 10B

Structural Engineering Design Criteria

APPENDIX 10B

Structural Engineering Design Criteria

10B.1 Introduction

The purpose of this appendix is to summarize the codes and standards and standard design criteria and practices that will be used in the design and construction of the structural engineering portions of the project. These criteria form the basis of the design for the structural components and systems of the project. More specific design information will be developed during detailed design to support equipment procurement and construction specifications. Section B2.0 summarizes the applicable codes and standards and Section B3.0 includes the general criteria for natural phenomena, design loads, architectural features, concrete, steel, and seismic design. Section B4.0 describes the structural design methodology for structures and equipment. Section B5.0 describes the hazard mitigation for the project.

10B.2 Design Codes and Standards

The design and specification of work shall be in accordance with all applicable laws and regulations of the federal government, the state of California, and with the applicable local codes and ordinances. A summary of the codes and industry standards to be used in the design and construction follows.

- Specifications for materials will generally follow the standard specifications of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI).
- Field and laboratory testing procedures for materials will follow standard ASTM specifications.
- Design and placement of structural concrete will follow the recommended practices and the latest version of the American Concrete Institute (ACI), the California Building Code, 2001 Edition (CBC 2001) (based on the Uniform Building Code [UBC] 1997), and the Concrete Reinforcing Steel Institute (CRSI).
- Design, fabrication, and erection of structural steel will follow the recommended practices and the latest version of the American Institute of Steel Construction Code (AISC) and CBC 2001.
- Steel components for metal wall panels and roof decking will conform to the American Iron and Steel Institute (AISI) Specification for the Design of Light Gage Cold-Formed Structural Members.
- Welding procedures and qualifications for welders will follow the recommended practices and codes of the American Welding Society (AWS).

- Preparation of metal surfaces for coating systems will follow the specifications and standard practices of the Steel Structures Painting Council (SSPC), National Association for Corrosion Engineers (NACE), and the specific instructions of the coatings manufacturer.
- Fabrication and erection of grating will follow applicable standards of the National Association of Architectural Metals Manufacturers (NAAMM).
- Design and erection of masonry materials will follow the recommended practices and codes of the latest revision of the ACI Concrete Masonry Structures Design and Construction Manual and the International Conference of Building Officials, California Building Code, 2001 Edition (CBC).
- Design will conform to the requirements of the Federal and California Occupational Safety and Health Administration (OSHA and CALOSHA).
- Design of roof coverings will conform to the requirements of the National Fire Protection Association (NFPA) and Factory Mutual (FM).

Other recognized standards will be used where required to serve as guidelines for the design, fabrication, and construction.

The following laws, ordinances, codes, and standards have been identified as applying to structural design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more conservative code will be met.

10B.2.1 Federal

- Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards.
- Walsh-Healy Public Contracts Act (Public Law [P.L.] 50-204.10).

10B.2.2 State

- Business and Professions Code Section 6704, et seq.; Section 6730 and 6736. Requires state registration to practice as a Civil Engineer or Structural Engineer in California.
- Labor Code Section 6500, et seq. Requires a permit for construction of trenches or excavations 5 feet or deeper where personnel have to descend. This also applies to construction or demolition of any building, structure, false work, or scaffolding that is more than three stories high or equivalent.
- Title 24 California Code of Regulations (CCR). Adopts current edition of CBC as minimum legal building standards.
- State of California Department of Transportation, Standard Specifications.
- Title 8 CCR Sections 1500, et seq.; Sections 2300, et seq.; and Sections 3200, et seq. Describes general construction safety orders, industrial safety orders, and work safety requirements and procedures.

- Regulations of the following state agencies as applicable.
  - Department of Labor and Industry Regulations.
  - Bureau of Fire Protection.
  - Department of Public Health.
  - Water and Power Resources.
- Title 8 CCR Section 450, et seq. and Section 750, et seq. Adapts American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASMEB and PVC) and other requirements for unfired and fired boilers.

10B.2.3 Industry Codes and Standards

- California Energy Commission, "Recommended Seismic Design Criteria for Non-Nuclear Power Generating Facilities in California".
- International Conference of Building Officials, "California Building Code" (CBC), 2001 Edition.
- Structural Engineers Association of California, "Recommended Lateral Force Requirements and Commentary," 1999 Recommendation and Commentary.
- Applied Technology Council, "Tentative Provision for the Development of Seismic Regulations for Buildings," (ATC-3-06), Amended December 1982.
- American Institute of Steel Construction (AISC).
  - Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design, June 1, 1989.
  - "Code of Standard Practice for Steel Buildings and Bridges."
  - "Allowable Stress Design Specifications for Structural Joints Using ASTM A325 or A490 Bolts."
  - Manual of Steel Construction Allowable Stress Design, 9th Edition.
- American Iron and Steel Institute (AISI) "North American Specification for the Design of Cold-Formed Steel Structural Members," 2001. "2002 Edition Cold-Formed Steel Design Manual Parts I-VII."
- American Welding Society (AWS) "Structural Welding Code-Steel Twelfth Edition" (AWS D1.1-2000).
- American Concrete Institute (ACI).
  - "Building Code Requirements for Reinforced Concrete" (ACI 318/318R-02).
  - "Code Requirements for Nuclear Safety Related Structures," Appendix B (Steel Embedments only) (ACI 349-01), except that anchor bolts will be embedded to develop their yield strength.
  - ACI 530-02 "Building Code Requirements for Concrete Masonry Structures".

- ACI 212.3R-91—Chemical Admixtures for Concrete.
- ACI 302.IR-96—Guide for Concrete Floor and Slab Construction.
- ACI 350R-01—Environmental Engineering Concrete Structures

- Structural and Miscellaneous Steel.
  - ASTM A569/A569M Specifications for Steel Carbon (0.15 maximum percent) Hot-Rolled Sheet and Strip, Commercial Quality.
  - ASME/ANSI STS-1-1986—Steel stacks, except for circumferential stiffening which shall be in accordance with British Standard 4076—1978 and except that seismic design shall be in accordance with CBC 2001.
- American Society for Testing and Materials (ASTM). The current versions of the following codes and standards shall be included as a minimum.
  - ASTM A36/A36M—Standard Specification for Carbon Structural Steel.
  - ASTM A53—Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
  - ASTM A276—Specification for Stainless Steel Bars and Shapes.
  - ASTM A500—Specification for Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - ASTM B695—Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
  - ASTM A307—Specification for Carbon Steel Bolts and Studs.
  - ASTM A123 —Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  - ASTM A153—Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - ASTM A82-A - Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - ASTM A185—Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - ASTM A 615/A615 M-Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- Masonry Institute of America, "Reinforced Masonry Engineering Handbook."
- American Water Works Association (AWWA).
  - "Standards for Welding Steel Tanks," (AWWA D100-96).
  - "Standards for Prestressed Concrete Pressure Pipe, Steel Cylinder Type for Water and Other Liquids" (AWWA C301-99).

- "Standards for Reinforced Concrete Water Pipe—Noncylinder Type, Not Prestressed"(AWWA C302-95).

- American Association of State Highway and Transportation Officials—(GDHS-2), "A Policy on Geometric Design of Highways and Streets."
- Heating, Ventilating, and Air Conditioning Guide by American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE).
- Uniform Plumbing Code (UPC), 2000 Edition.
- International Association of Plumbing and Mechanical Officials.
- National Fire Protection Association Standards (NFPA).
- Steel Structures Painting Council Standards (SSPC).
- American Society of Nondestructive Testing (SNT-TC-1A).
- International Standard Organization (ISO) 3945-85 "Mechanical Vibration of Large Rotating Machines with Speed Range from 10 to 200 revs/sec—Measurement and Evaluation of Vibration Severity In Situ."

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents. Where no other standard or code governs, the CBC will be used.

10B.3 Structural Design Criteria

10B.3.1 Natural Phenomena

10B.3.1.1 Datum

The finished grade of the facility will be approximately 22 to 31 feet above mean sea level.

10B.3.1.2 Wind Speed

The design wind speed will be 80 miles per hour based on CBC 2001 edition for a 50-year recurrence interval. This design wind speed will be used to determine wind loads for all structures as discussed in Subsection 10B3.2.3, Wind Loads.

10B.3.1.3 Temperature

The design basis temperatures for civil and structural systems will be as follows:

Maximum	108 degrees, F
Minimum	25 degrees, F

10B.3.1.4 Frost Penetration

The site is located in an area free of frost penetration. Bottom elevation of all foundations for structures and equipment, however, will be maintained at a minimum of 1 inch below the finished grade.

10B.3.1.5 Seismicity

The plant site is located in Seismic Zone 4, as determined from Figure No.16-2, "Seismic Zone Map of the United States," of CBC 2001.

10B.3.1.6 Snow

The plant site is located in a zero ground snow load area, as determined from Figure No. A-16-1 of CBC 2001.

10B.3.2 Design Loads

Design loads for all structures will be determined according to the criteria described below, unless the applicable building code requires more severe design conditions.

10B.3.2.1 Dead Loads

Dead loads will consist of the weights of the structure and all equipment of a permanent or semi-permanent nature including tanks, bins, wall panels, partitions, roofing, piping, drains, electrical trays, bus ducts, and the contents of tanks and bins measured at full operating capacity. The contents of tanks and bins shall not be considered as effective in resisting column uplift due to wind forces but shall be considered effective for seismic forces.

10B.3.2.2 Live Loads

Live loads will consist of uniform live loads and equipment live loads. Uniform live loads are assumed unit loads which are sufficient to provide for movable and transitory loads, such as the weight of people, portable equipment and tools, planking and small equipment, or parts, which may be moved over or placed on floors during maintenance operations. These uniform live loads shall not be applied to floor areas which will be permanently occupied by equipment.

Equipment live loads are calculated loads based upon the actual weight and size of the equipment and parts to be placed on floors during dismantling and maintenance, or to be temporarily placed on or moved over floors during installation.

Uniform live loads will be in accordance with CBC 2001, but will not be less than the following:

a. Roofs 20 psf

All roof areas will be designed for wind loads as indicated in Subsection B3.2.3, Wind Loads. Ponding loading effect due to roof deck and framing deflections will be investigated in accordance with AISC Specification Article K2. All roof areas will be designed for a minimum of 20 pounds per square foot (psf) live load in addition to calculated dead loads.

b. Floors and Platforms (Steel grating and checkered plate) 100 psf

In addition, a uniform load of 50 psf will be used to account for piping and cable tray, except where the piping and cable tray loads exceed 50 psf, the actual loads will be used. Pipe hanger loads for the major piping systems will be specifically determined and located. Piping expansion and dynamic loads will be considered on an individual basis for their effect on the structural systems. Loads imposed on perimeter beams around pipe chase areas will also be considered on an individual basis.

c.	Floors (Elevated Concrete Floors)	125 psf

In addition, elevated concrete slabs will be designed to support an alternate concentrated load of 3 kips (kilopounds) in lieu of the uniform loads, whichever governs. The concentrated load will be treated as a uniformly distributed load acting over an area of 2.5 square feet, and will be located in a manner to produce the maximum stress conditions in the slab.

d.	Control Room Floor	150 psf
e.	Stairs, Landings and Walkways	100 psf

In addition, a concentrated load of 2 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

f.	Pipe Racks	100 psf

Where the piping and cable tray loads exceed the design uniform load, the actual loads will be used. In addition, a concentrated load of 15 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

g. Hand Railings

Hand railings will be designed for either a uniform horizontal force of 50 plf applied simultaneously with a uniform vertical live load of 100 plf or a 200 pound concentrated load applied at any point and in any direction, whichever governs.

h.	Slabs on Grade	250 psf

Consideration will be given to designing appropriate areas of the ground floor for support of heavy equipment such as construction and maintenance cranes.

i.	Truck Loading Surcharge Adjacent to Structures	250 psf
j.	Truck Support Structures	AASHTO-HS-20-44
k.	Special Loading Conditions	Actual loadings

Laydown loads from equipment components during maintenance and floor areas where trucks, forklifts or other transports will have access, will be considered in the design live load.

Live loads may be reduced in accordance with the provisions of CBC Section 1606.

Posting of the floor load capacity signs for all roofs, elevated floors, platforms and walkways will be in compliance with the Occupational Safety and Health Standard (OSHA),

Walking and Working Surfaces, Subpart D. Floor load capacity for slabs on grade will not be posted.

10B.3.2.3 Wind Loads

Wind loads for all structures will be based on CBC 2001. Basic wind speed shall be 80 miles per hour and wind stagnation pressure (qs) of 16.4 psf. A step function of pressure with height under Exposure C conditions will be used. The Importance Factor shall equal 1.0. Height brackets and velocity pressures will be as follows.

Height Above Ground (Feet)	Velocity Pressure (Pounds-force per square foot)
Grade to 20	18.5
20 to 40	21.5
40 to 60	23.5
60 to 100	26.4
100 to 160	29.4
160 to 200	30.7

The above velocity pressures are average values for the indicated height brackets. The design wind pressures will be determined by multiplying the velocity pressures by the appropriate pressure coefficients given in CBC Table No. 16-H using Method 1.

If wind design governs, the detailing requirements and limitations in the CBC 2001 seismic provisions will also be followed.

10B.3.2.4 Steel Stack

The steel stack and supports shall be capable of enduring specified normal and abnormal design operating conditions in combination with high wind or seismic event for the design life of the facility. Effects of wind will include along-wind and across-wind response. The design will address the design considerations, meet the requirements, and utilize the design methods of Steel Stacks, ASME/ANSI STS-1-1986, and AISC Manual of Steel Construction Allowable Stress Design, Ninth Edition, except that increased allowable stresses for wind will not be used. Design values for yield strength and modulus of elasticity of the stack material will depend on the composition of the material and the maximum temperature of the metal at design operating conditions, and will be as prescribed by the ASME Pressure Vessel Code, Section VIII, Division 2, Part AM. Seismic loads shall be in accordance with CBC 2001.

10B.3.2.5 Seismic Loads

Seismic loads will be determined in accordance with the requirements specified in Subsection 10B3.6, Seismic Design Criteria.

10B.3.2.6 Construction Loads

The integrity of the structures will be maintained without use of temporary framing struts or ties and cable bracing insofar as possible. However, construction or crane access considerations may dictate the use of temporary structural systems.

10B.3.2.7 Earth Pressures

Earth pressures will be in accordance with the recommendations contained in the project-specific "Final Geotechnical Investigation and Foundation Report".

10B.3.2.8 Groundwater Pressures

Hydrostatic pressures due to groundwater or temporary water loads will be considered.

10B.3.2.9 Special Considerations for Structures and Loads During Construction

For temporary structures, or permanent structures left temporarily incomplete to facilitate equipment installations, or temporary loads imposed on permanent structures during construction, the allowable stresses may be increased by 33 percent.

Structural backfill may be placed against walls, retaining walls, and similar structures when the concrete strength attains 80 percent of the design compressive strength (f′c), as determined by sample cylinder tests. Restrictions on structural backfill, if any, will be shown on the engineering design drawings.

Metal decking used as forms for elevated concrete slabs, will be evaluated to adequately support the weight of concrete plus a uniform construction load of 50 psf, without an increase in allowable stresses.

10B.3.2.10 Load Combinations

At a minimum, the following load combinations will be considered. Applicable CBC 2001 prescribed load combinations will also be considered.

- Dead load
- Dead load plus live load plus all loads associated with normal operation of the equipment, e.g., temperature and pressure loads, piping loads, normal torque loads, impact loads, etc.
- Dead load plus live load plus all loads associated with normal operation plus wind load
- Dead load plus live load plus all loads associated with normal operation plus seismic load
- Dead load plus construction loads
- Dead load plus live load plus emergency loads
- Dead load plus wind load
- Dead load plus seismic load

Every building component shall be provided with the strength adequate to resist the most critical effect resulting from the following combination of loads.

- Dead plus floor live plus roof live
- Dead plus floor live plus wind
- Dead plus floor live plus seismic
- Dead plus floor live plus wind plus roof live/2
- Dead plus floor live plus roof live plus wind/2
- Dead plus floor live plus roof live plus seismic

Note: Use live load only where required by CBC 2001 in combination with seismic.

10B.3.2.11 Allowable Stresses

Each load combination shall not exceed the allowable stress permitted by the appropriate code for that combination.

The 1997 UBC/2001 CBC allows a 33 percent stress increase for seismic and wind design in Section 1612.3.2 which specifies loading combinations to be used for the design of structures and portions thereof when using the allowable stress design method. These combinations are permitted a one-third increase in allowable stresses for all combinations including wind or seismic. The design of steel structures will utilize these combinations along with the special seismic load combinations specified in Section 1612.4. Section 1612.3.1, which does not allow a 33 percent stress increase for seismic and wind design of structures, specifies loading combinations to be used for the design of structures and portions thereof, will not be used. Therefore, the load combinations of section B3.2.11.2 (steel design) will comply with the UBC/CBC design requirements. Additionally, welded, bolted, or other intermittent connection such as inserts for anchorage of nonstructural components will not use the 1/3 increase in allowable stress when considering wind and seismic forces.

10B.3.2.11.1 Concrete Structures

For reinforced concrete structures and equipment supports, using the strength method, the load factors and load combinations will be in accordance with CBC Section 1909.

The required strength (U) shall be at least equal to the following.

- U = 1.4 Dead + 1.7 Live
- U = 0.75 (1.4 Dead + 1.7 Live + 1.7 Wind)
- U = 0.9 Dead + 1.3 Wind
- U = 1.4 (Dead + Live + Seismic)
- U = 0.9 Dead + 1.4 Seismic
- U = 1.4 Dead + 1.7 Live + 1.7 Earth Pressure
- U = 0.9 Dead + 1.7 Earth Pressure

10B.3.2.11.2 Steel Structures

The required strength (S) based on the elastic design methods and the allowable stresses (Fs) defined in Part 1 of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings is as follows.

- S = Dead + Live + (Roof Live Load)
- S = Dead + Live + (Wind or Earthquake/1.4)
- S = Dead + Live + Earthquake/1.4
- S = 0.9 Dead + Earthquake/1.4

Frame members and connections will conform to the additional requirements of CBC Sections 1633 and 2213.

10B.3.3 Architecture

General design criteria for the architectural systems are as follows.

10B.3.3.1 Architecture—Engineered Buildings

General design criteria for materials and installation of architectural systems or components will be as follows.

- Interior Walls. Where durability is required, interior walls may be constructed of concrete block masonry, structurally designed and reinforced as required. In offices, shops, etc., metal studs with gypsum board will usually be used to form interior partitions. Insulation for sound control will be used where required by design.

- Fire Exits. Fire exits will be provided at outside walls as required by code. Exit signs will be provided. Fire doors will bear an Underwriters' Laboratories certification level for class of opening and rating for door, frame, and hardware. Doors will conform to wood or hollow metal door requirements and have fillers adequate to meet the fire rating.

- Large Access Exterior Doors. Large access exterior doors will be rolling steel type with weather seals and windlocks. Components will be formed from galvanized steel, factory primed, and field painted. Doors will be motor-operated with override manual operation.

- Painting. Exterior steel material that is not galvanized or factory finished will be painted. Painted color will match or harmonize with the color of the exterior face of the wall panels.

- Color Schemes. Color schemes will be selected for overall compatibility.

10B.3.3.2 Architecture—Prefabricated Metal Buildings

Prefabricated metal buildings (packaged to include exterior doors, wall louvers, windows, and related enclosure components) will be furnished as follows.

- Building Enclosure. Building enclosures will be of manufacturer's standard modular rigid frame construction with tapered or uniform depth rafters rigidly connected at ends to pinned-base tapered or uniform depth columns. Purlins and girts will be cold-formed "C" or "Z" sections conforming to "Specifications for Design of Cold-Formed Steel Structural Members" of American Iron and Steel Institute. All other members will be of ASTM A36 hot rolled shapes conforming to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" of American Institute of Steel Construction. Roof slopes will be approximately 1-inch rise per 12 inches of run. Metal roof coverings will be of prefinished standing seam panels of 24-gauge minimum.

- Steel. Cold-formed components will conform to ASTMA570, Grade E, 42,000 psi minimum yield for material thicknesses equal to or less than 0.23 inch, or to ASTMA375, 50,000 pounds per square inch (psi) minimum yield for high tensile strength purlin or girt sections with material thicknesses equal to or less than 0.23 inch. Roof covering and wallcovering will conform to ASTM A446, Grade A, galvanized 33,000 psi minimum yield. All cold-formed components will be manufactured by precision roll or break forming.

10B.3.4 Concrete

Reinforced concrete structures will be designed in accordance with CBC 2001 and ACI 318-02, Building Code Requirements for Reinforced Concrete.

10B.3.4.1 Materials

The materials described below will be specified and used as a basis for design.

- Reinforcing Steel. Reinforcing steel shall meet the requirements of ASTM A615 Grade-60. Welded wire fabric for concrete will conform to ASTM A 185.
- Cement. Cement used in all concrete mixes will be portland cement meeting the requirements of ASTM C150.
- Aggregates. Fine aggregates will be clean natural sand. Coarse aggregates will be crushed gravel or stone. All aggregates shall meet the requirements of ASTM C33.
- Admixtures. Plasticizers and retarders will be used to control setting time and to obtain optimum workability. Air entrainment of 4 to 6 percent by volume will be used in all concrete mixes. Calcium chloride will not be permitted. Interior slabs to be trowel finished may use less air entrainment.
- Water. Clean water of potable quality shall be used in all concrete.

10B.3.4.2 Design

The system of concrete and steel reinforcing strength combinations will be used as follows.

- Concrete strength—See table in Subsection 10B3.4.3
- Reinforcing strength—60,000 psi, Grade 60

10B.3.4.3 Mixes

The design compressive strength (f′c) of concrete and grout, as measured at 28 days, will be as follows:

Electrical ductbank encasement and lean concrete backfill (Class L-1)	2000 psi
Structural concrete (Class S-1)	3000 psi
Structural concrete (Class S-2)	4000 psi
Grout (Class G-1)	5000 psi

10B.3.4.4 Concrete Tests

Quality control testing of concrete will be performed by an independent laboratory and will consist of the following.

- Preliminary Review. Before concrete mixes are designed, the source and quality of materials will be determined and the following reports will be submitted.
  - The type, brand, manufacturer, composition, and method of handling (sack or bulk) of cement.
  - The type, source, and composition of fly ash.
  - The classification, brand, manufacturer, and active chemical ingredients of all admixtures.
  - The source of coarse aggregates and test reports to verify compliance with ASTMC33.
  - The source of fine aggregates and test reports to verify compliance with ASTM C33.
  - The results of tests to determine compliance of admixtures with appropriate ASTM requirements.
- Design Mix Tests. Concrete will be proportioned to provide an average compressive strength as prescribed in CBC 2001 Section 1905.3. Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than required average compressive strength will be established based on trial mixtures in accordance with CBC Section 1905.3.3
- Field Control Tests. Field control tests will include the following.
  - Aggregate gradation. Each 500 tons of fine aggregate and each 1,000 tons of coarse aggregate will be sampled and tested in accordance with ASTM D75 and C136.
  - Slump. A slump test will be made from each of the first three batches mixed each day. An additional test will be made for each 50 cubic yards placed in any one day.
  - Air content. An air content test will be made from one of the first three batches mixed each day and from each batch of concrete from which compression test cylinders are made. Air content tests will be in accordance with ASTM C231.
  - Compression tests. One set of four concrete test cylinders will be made each day from each class of concrete being placed. Additional sets will be made depending on the amount of concrete placed each day. For each additional 100 cubic yards of each class, or major fraction thereof, placed in any one day, four additional sets of cylinders will be made. One cylinder of each set will be tested at an age of seven days, two cylinders of each set will be tested at 28 days, and one cylinder shall be stored until otherwise directed. Compression tests will be in accordance with ASTMC39.

10B.3.4.5 Reinforcing Steel Test

Mill test reports certifying that reinforcing steel is in accordance with ASTM and project specifications will be required.

10B.3.5 Steel and Other Metals

10B.3.5.1 Structural Steel

Steel framed structures will be designed in accordance with the CBC 2001 and the AISC Specification for the Structural Steel Building, Allowable Stress Design and Plastic Design, June 1, 1989. In addition, steel framed structures will be designed in accordance with the criteria discussed in the following subsections.

10B.3.5.1.1 Materials. Structural steel shapes, plates, and appurtenances for general use will conform to ASTM A36 or A 572. Structural steel required for heavy framing members may consider the use of ASTM A441. Structural steel required for tubes will conform to ASTM A500, Grade B. Connection bolts will conform to ASTM A325. Connections will conform to AISC Specification for Structural Joints. Welding electrodes will be as specified by the AWS. All structural steel will be shop primed after fabrication. Exterior structural steel may be hot dipped galvanized in lieu of prime painted.

10B.3.5.1.2 Tests. Mill test reports or reports of tests made by the fabricator will be required certifying that all material is in conformance with the applicable ASTM specification. In addition, the fabricator will provide an affidavit stating that all steel specified has been provided at yield stresses in accordance with the drawings and the specification.

10B.3.5.1.3 Design. All steel framed structures will be designed as "rigid frame" (AISC Specification Type-1) or "simple" space frames (AISC Specification Type-2), utilizing single span beam systems, vertical diagonal bracing at main column lines, and horizontal bracing at the roof and major floor levels. The use of Type 1 rigid frames will generally be limited to one-story, open garage, warehouse or shed-type structures, or to prefabricated metal buildings.

Suspended concrete slabs will be considered as providing horizontal stability by diaphragm action after setup and curing. Deflections of the support steel will be controlled to prohibit "ponding" of the fresh concrete as it is placed. Metal roof decks attached with welding washers or fasteners may be considered to provide a structure with lateral force diaphragm action. Grating floors will not be considered as providing horizontal rigidity.

Connections will be in accordance with AISC standard connection design for field bolted connections. Connections will be designed with bolts for bearing type joints with threads in shear plane except where connections are required to be slip-critical. Larger diameter bolts may be used to develop larger capacity connections or elsewhere as determined by the engineer.

10B.3.6 Seismic Design Criteria

This section provides the general criteria and procedures that will be used for seismic design of structures, equipment, and components.

The project site is located in Seismic Zone 4 according to the California Building Code, 2001 edition. The seismic performance objectives for this facility are as follows.

- Resist minor levels of earthquake ground motion without damage.
- Resist moderate levels of earthquake ground motion without structural damage, but possibly experience some nonstructural damage.
- Resist major levels of earthquake ground motion without collapse, but possibly with some structural as well as nonstructural damage.

To achieve these objectives and to meet the requirements of the CEC and local codes, the facility will be designed in accordance with CBC 2001. All structures, equipment internals, and components will be separated from adjoining structures.

10B.3.6.1 Buildings and Structures

The seismic zone used for this site will be Zone 4 as determined from CBC 2001 Figure No. 16-2 titled "Seismic Zone Map of the United States," using an Importance Factor of 1.00. Seismic loading will be used in the design of structures only when it is greater than the computed wind loads.

Nonbuilding structures are to be designed in accordance with CBC 2001 Section 1634. These are typically regular structures as defined in the CBC, so the static lateral force procedure will be applicable. In the event that dynamic analysis will be required based on discussions with the CBO, the affected structures will be evaluated in accordance with the requirements of the CBC.

Buildings and structures defined by CBC 2001 Section 1629.8.3 will be designed using the static lateral force procedure of Section 1630.

Buildings and structures defined by CBC 2001 Section 1629.8.4 will be designed using the dynamic lateral force procedure of Section 1631. The ground motion representation will use the response spectrum indicated in CBC Figure 16-3.

Lateral forces on elements of structures and nonstructural components will be determined from the greater of CBC 1632.2 requirements, or CBC 1634.5 requirement for equipment supported laterally at or below grade.

Steel framed structures will comply with the requirements of CBC Chapter 22, Section 2213 including the requirements of Section 2213.5.1

Water storage tanks will meet the seismic design requirements of AWWA D100, Section 13, and CBC 1634.

10B.4 Structural Design Methodology

This section describes the structural aspects of the design of the proposed facility. Each major structural component of the plant is addressed by defining the design criteria and analytical techniques that will be employed.

10B.4.1 Structures

10B.4.1.1 Combustion Turbine Foundations

The combustion turbine foundations will be designed to support the turbine and generator components.

The foundation will be designed to resist the loadings furnished by the manufacturer and will be constructed of reinforced concrete.

10B.4.1.1.1 Foundation Loads. Foundation loads will be furnished by the combustion turbine manufacturer and will be superimposed with loads for the foundation itself. Typical loading data supplied by the manufacturer include the following.

- Dead loads
- Live loads
- Wind loads from project specific criteria
- Seismic loads from project specific criteria
- Hydrostatic loads
- Temperature and pressure loads
- Emergency loads such as turbine accident loads

10B.4.1.1.2 Induced Forces. The combustion turbine and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts or sleeved through-bolts designed to resist the equipment forces.

10B.4.1.1.3 Structural Criteria. The foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Subsection 10B3.4, Concrete. Previous borings suggest that there is a significant variation to the depth of bedrock that underlies a layer of Bay Mud and fill. The foundation system will likely be a reinforced mat bearing an exposed/built up non-reinforced fill material surface that is installed on top of the prepared bedrock. This could require a significant amount excavation and subgrade preparation. Alternatively, a rigid mat supported on short piles or drilled caissons could be used. Final selection by the project geotechnical engineers will be based on specific test drillings at the major foundations upon completion of demolition.

The foundation design will address the following considerations:

- Soil bearing capacities and earth pressures
- Allowable settlements
- Soil liquefaction potential
- Equipment, structure, and environmental loads
- Natural frequencies of rotating equipment
- Access and maintenance
- Equipment performance criteria
- Dynamic effects of the rotating machinery

Environmental loading will be determined in accordance with, Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads.

Seismic loading to the foundation from the combustion turbine will be calculated using equivalent lateral forces applied at the center-of-gravity of the equipment in accordance with the criteria specified in Subsection 10B3.6, Seismic Design Criteria for rigid equipment.

Load combinations and their respective strength factors for the foundation design will be as indicated in Subsection 10B3.2.10, Load Combinations and Subsection 10B3.2.11, Allowable Stresses.

10B.4.1.1.4 Analytical Techniques. The combustion turbine foundation will be designed using static analysis techniques assuming a rigid mat. The mat will be sized such that the allowable settlement and bearing pressure criteria developed from a detailed subsurface investigation will not be exceeded. The foundation will be analyzed as a combined footing assuming a linear soil pressure distribution. The mat will be proportioned such that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading. The minimum factors of safety against overturning and sliding will be 1.5 and 1.1, respectively.

The combustion turbine foundation will be checked for dynamic response of the operating combustion turbine. Manual calculations and simple computer models based on the fundamental principles of dynamic behavior of structures will be used to determine the natural frequencies of the support system. Where soil-structure interaction effects are important, low strain soil properties will be used to calculate soil springs using the procedures from Vibrations of Soils and Foundation by Richard, Hall, and Woods or a similar procedure. The concrete foundation will be analyzed as a rigid body on soil springs with the equipment modeled as a rigid mass located at its center of gravity and rigidly attached to the foundation. The foundation will be proportioned such that the principal natural frequencies will be at least 10 percent removed from the equipment operating speed.

Should the resulting foundation design prove to be uneconomical, the dynamic behavior of the foundation will be evaluated and compared to ISO 3945 Criteria for Vibration Severity. The resultant vibration level will be within the "Good" range of this standard.

A procedure for the dynamic analysis of large fan foundations supported by soil or piers, may be used to evaluate the dynamic behavior of the turbine foundations.

10B.4.1.2 Exhaust Duct and CO/SCR Foundation

The exhaust duct and carbon monoxide/selective catalytic reduction (CO/SCR) foundation will be designed to support the exhaust duct and CO/SCR catalyst structures and associated equipment.

The foundation will be designed to resist the loadings furnished by the manufacturer and will be constructed of reinforced concrete.

10B.4.1.2.1 Foundation Loads. Foundation loads will be furnished by the exhaust duct manufacturer and will be superimposed with loads for the foundation itself. Typical loading data supplied by the manufacturer include the following:

- Dead loads
- Live loads
- Wind loads
- Seismic loads

- Hydrostatic loads
- Temperature and pressure loads

The exhaust duct and CO/SCR foundation will be designed to resist a superimposed uniform live load of 250 psf over the area not otherwise occupied by equipment.

10B.4.1.2.2 Induced Forces. The exhaust duct and CO/SCR and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the equipment forces.

10B.4.1.2.3 Structural Criteria. The foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Section B3.4 Concrete. Previous borings suggest that there is a significant variation to the depth of bedrock that underlies a layer of Bay Mud and fill. The foundation system will likely be a reinforced mat bearing an exposed/built-up nonreinforced fill material surface that is installed on top of the prepared bedrock. This could require a significant amount excavation and subgrade preparation. Alternatively, a rigid mat supported on short piles or drilled caissons could be used. Final selection by the project geotechnical engineers will be based on specific test drillings at the major foundations upon completion of demolition.

The foundation design will address the following considerations:

- Soil bearing capacities and earth pressures
- Allowable settlements
- Soil liquefaction potential
- Equipment, structure, and environmental loads
- Access and maintenance
- Equipment performance criteria

Environmental loading will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads.

Seismic loading to the foundation will be supplied by the exhaust duct manufacturer and will reflect the structural system used by the exhaust duct to resist lateral loading.

Load combinations and their respective allowable strengths will be as indicated in Subsection 10B3.2.10, Load Combinations and Subsection 10B3.2.11, Allowable Stresses.

10B.4.1.2.4 Analytical Techniques. The exhaust duct and CO/SCR foundation will be designed using static analysis techniques assuming a rigid mat. The mat will be sized such that the allowable settlement and bearing pressure criteria developed from a detailed subsurface investigation will not be exceeded. The foundation will be analyzed assuming a linear soil pressure distribution. The mat will be proportioned such that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading. The minimum factors of safety against overturning and sliding will be 1.5 and 1.1, respectively.

10B.4.1.3 Stack and Foundation

The stacks will be carbon steel stacks supported on a reinforced concrete mat foundation. The height of the stacks will be approximately 144 feet and each will be 18 feet in diameter.

10B.4.1.3.1 Foundation Loads. Foundation loads will be determined using project specific design criteria.

The design of the stack and foundation will include the following loads:

- Dead loads
- Live loads
- Wind loads
- Seismic loads
- Temperature and pressure loads

Foundation loading magnitudes cannot be determined until specific stack design is completed.

10B.4.1.3.2 Induced Forces. The stack will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the foundation and stack induced forces.

10B.4.1.3.3 Structural System. The steel stack will resist lateral loading as a fixed base cantilevered structure.

10B.4.1.3.4 Structural Criteria. The predominate forces acting on the stack will result from wind or seismic loading. The stack will be designed as indicated in Subsection 10B3.2.4, Steel Stacks.

Seismic loads will be determined in accordance with CBC Section 1634 Nonbuilding Structures. The fundamental period will be determined using CBC equations and will be calculated by both considering and ignoring the structural contribution of any lining material. The lower period will be used in the development of the seismic forces.

The allowable longitudinal stress, F, for the design of the stack shell will be determined from the following equations from ASME/ANSI STS-1-1986.

$F = 1/8\ Et/r/FS$ for $t/r < 8Fp/E$
$F = [Fy - Ks\ (Fy - Fp)]\ /\ FS$ for $t/r > 8Fp/E$
$< 20Fy/E$
$F = Fy/FS$ for $t/r > 20Fy/E$

where

E	=	Steel modulus of elasticity,
t	=	Shell plate thickness with corrosion allowance,
r	=	Shell radius,
FS	=	Factor of safety equal to 1.5,
Fy	=	Steel yield stress, and
Fp	=	Steel proportional limit equal to 0.70 Fy.

$$Ks = \left[\frac{\frac{20Fy}{E} - \frac{t}{r}}{\frac{20Fy}{E} - \frac{8Fp}{E}}\right]^2$$

The minimum shell thickness will be 1/4-inch plus 1/16-inch corrosion allowance. The corrosion allowance will be considered in the generation of seismic loads but not in the resistance to seismic or wind loads. Allowable stresses for stiffeners, platform members, and other details will be in accordance with the American Institute of Steel Construction Allowable Stress Design, Ninth Edition. Allowable stresses for the shell will not be increased for wind or seismic loadings.

The stack will likely be supported using an octagonal or circular shaped reinforced mat footing. The foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Subsection 10B3.4, Concrete. Previous borings suggest that there is a significant variation to the depth of bedrock that underlies a layer of Bay Mud and fill. The foundation system will likely be a reinforced mat bearing an exposed/built-up nonreinforced fill material surface that is installed on top of the prepared bedrock. This could require a significant amount excavation and subgrade preparation. Alternatively, a rigid mat supported on short piles or drilled caissons could be used. Final selection by the project geotechnical engineers will be based on specific test drillings at the major foundations upon completion of demolition.

The foundation design will address the following considerations.

- Soil bearing capacities and earth pressures
- Allowable settlements
- Soil liquefaction potential
- Structure and environmental loads

Load combinations and their respective allowable strengths will be as indicated in Subsection 10B3.2.10, Load Combinations and Subsection 10B3.2.11, Allowable Stresses.

10B.4.1.3.5 Analytical Techniques. Moments, shears, and axial forces will be calculated using static analysis procedures on a cantilevered member. Longitudinal stresses resulting from axial loads and flexure will be combined and compared to a single allowable stress.

The stack foundation will be designed using static analysis techniques assuming a rigid mat. The mat will be sized such that the allowable settlement and bearing pressure criteria developed from a detailed subsurface investigation will not be exceeded. The foundation will be analyzed assuming a linear soil pressure distribution. The mat will be proportioned to resist the vertical gravity loads concurrent with the controlling lateral loads while maintaining a minimum 2.5 factor of safety against overturning. The factor of safety against sliding will be a minimum of 1.5.

10B.4.1.4 Buildings

The various plant site buildings will provide support, enclosure, protection, and access to the systems contained within its boundaries.

10B.4.1.4.1 Foundation Loads. Foundation loads will be determined from the analysis and design of the superstructure and from the support of the equipment contained within the structure. The following loads will be considered.

- Dead loads
- Live loads

- Equipment and piping loads
- Wind loads
- Seismic loads

10B.4.1.4.2 Induced Forces. Each building and associated major equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist any induced forces.

10B.4.1.4.3 Structural System. The buildings will be designed as AISC Type 1 rigid frames or as Type 2 simple braced frame. For the purpose of resisting seismic lateral loads, the structure will be classified as a regular structure with a concentric braced frame, ordinary moment resisting frame, or special moment resisting frame in accordance with the definitions of Chapters 16 and 22 of the CBC.

10B.4.1.4.4 Structural Criteria. The building steel frames will be designed and constructed using the materials and criteria set forth in Subsection 10B3.5, Steel and Other Metals.

Environmental loading will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads.

Seismic loading for the buildings will be calculated using equivalent lateral forces applied to the structure in accordance with the procedures of CBC Chapter 16.

The building foundations will be designed and constructed using reinforced concrete according to the criteria set forth in Subsection 10B3.4, Concrete. The foundation system will likely be comprised of spread footings supported directly on bedrock or very dense controlled backfill to resist the column loads and an isolated slab on grade floor system or mat foundation supported directly on bedrock or very dense controlled backfill. Only very light structures may be placed on shallow foundations. Foundation types will be controlled by depth of bedrock at specific locations and will be verified by the project geotechnical investigation.

The foundation design will address the following considerations.

- Soil bearing capacities and earth pressures
- Allowable settlements
- Soil liquefaction potential
- Equipment, structure, and environmental loads
- Access and maintenance
- Equipment performance criteria

Load combinations and their respective allowable stresses will be as indicated in Subsection 10B3.2.10, Load Combinations and Subsection 10B3.2.11, Allowable Stresses.

10B.4.1.4.5 Analytical Techniques. The building foundations will be designed using static analysis techniques assuming rigid spread footings or rigid mat. Spread footings or the mat will be sized such that the allowable settlement and bearing pressure criteria developed from a detailed subsurface investigation will not be exceeded assuming a linear soil pressure distribution. The footings will be proportioned such that the resultant of the soil

pressure coincides as nearly as possible with the resultant of the vertical loading. The minimum factors of safety against overturning and sliding will be 1.5 and 1.1, respectively.

10B.4.2 Tanks

10B.4.2.1 Vertical, Cylindrical Field Erected Water Storage Tanks

The vertical, cylindrical, field erected water storage tanks will generally be of carbon steel construction with a protective interior coating.

The tank roof will be of the self-supported dome or cone type. The tank bottom will be ground supported, flat bottomed, with a slope of 1 percent. The tank will be provided with ladders, landing platforms, and handrails as required to provide access to all working areas. Vents, manholes, overflow piping, and grounding lugs will also be provided as necessary.

The typical foundation will consist of a circular ringwall. The interior of the ring will be comprised of compacted backfill with a layer of compacted sand to serve as a bearing surface for the tank bottom.

10B.4.2.1.1 Foundation Loads. Foundation loads will be determined using project specific design criteria.

- The design of the tank and foundation will include the following loads: Dead loads
- Live loads
- Wind loads
- Seismic loads
- Hydrodynamic loads

Foundation loading magnitudes from the tank will not exceed bearing allowables of the soil.

10B.4.2.1.2 Induced Forces. The storage tanks will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist all induced forces in accordance with AWWA D100.

10B.4.2.1.3 Structural System. The storage tanks will resist lateral loading through shear in the tank walls. Overturning will be resisted by anchor bolts connecting the tank wall to the foundation.

10B.4.2.1.4 Structural Criteria. The foundation will be designed and constructed as a reinforced concrete ringwall using the criteria from Subsection 10B3.4, Concrete. The tank structures will be designed and constructed using the criteria established in AWWA D100.

Environmental loadings will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads, multiplied by the appropriate pressure coefficient from Table No. 16-H of CBC.

Seismic loads will be determined in accordance with Subsection 10B3.6, Seismic Design Criteria and AWWA D100, Section 13.

The seismic overturning moment will be determined from AWWA D100, Section 13.3.3.1 for a Seismic Zone 4. The structure coefficient will be determined from Table 16-P. The value of C1 will be determined from Section 13.3.3.1. The site amplification factor, S, will be determined from Table 17.

Load combinations and their respective allowable strengths will be as indicated in Subsection 10B3.2.10, Load Combinations, Subsection 10B3.2.11, Allowable Stresses, and Section 3 of AWWA D100.

Design loads will be applied at the center of gravity of the tank. The design of the tank foundation will include the moment resulting from lateral displacement (hydrodynamics) of the tank contents in accordance with AWWA D100, Section 13.3.3.2.

Piping connections will be designed with a minimum 2 inches of flexibility in all directions as specified in AWWA D100, Section 13.5.

10B.4.2.1.5 Analytical Techniques. The tank foundation will be designed using static analysis techniques of a circular ringwall. The ringwall will be proportioned to resist the dead load of the tank and the overturning moment determined from AWWA D100. The ringwall will also be proportioned to resist maximum anchor bolt uplift force. Circumferential reinforcing steel hoops will be provided in the ringwall to develop the hoop stress produced by lateral soil pressure within the ringwall. The ringwall will be proportioned to resist the vertical gravity loads concurrent with the controlling lateral loads while maintaining a minimum 1.5 factor of safety against overturning. The factor of safety against sliding will be a minimum of 1.1.

The tank structure will be designed and proportioned such that during the application of any load, or combination of loads, the maximum stresses as stipulated in AWWA D100 will not be exceeded.

10B.4.2.2 Horizontal, Cylindrical, Shop Fabricated Storage Tanks

The horizontal, cylindrical, shop fabricated tanks will be of carbon steel construction.

The tanks will be provided with ladders, landing platforms, and handrails as required to provide access to all working areas. Each tank will be provided with a fill connection, fill drain, overflow, vent connections, manholes, and grounding lugs as necessary.

The foundations will be designed to resist the loadings imposed by the tanks and will be constructed of reinforced concrete.

10B.4.2.2.1 Foundation Loads. Foundation loads will be furnished by the tank manufacturer and will be superimposed with loads for the foundation itself.

Typical loadings supplied by the manufacturer include the following:

- Dead loads
- Live loads
- Wind loads
- Seismic loads
- Temperature and pressure loads
- Hydrodynamic loads

10B.4.2.2.2 Induced Forces. The tanks will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist all induced forces.

10B.4.2.2.3 Structural System. The tanks will be supported by integral legs or saddle supports designed to resist gravity and environmental loadings.

10B.4.2.2.4 Structural Criteria. The foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Subsection 10B3.4, Concrete. The foundation will likely be a rigid mat supported directly on bedrock or very dense controlled backfill. Only very light structures may be supported on shallow foundations. Foundation types will be controlled by depth of bedrock at specific locations and will be verified by the project geotechnical investigation.

Environmental loadings will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads multiplied by the appropriate pressure coefficient from Table No. 16-H of CBC.

Seismic loading will be calculated using equivalent lateral forces applied at the center of gravity of the tank or tank component in accordance with the criteria specified in Subsection 10B3.6, Seismic Design Criteria.

Load combinations and their respective allowable strengths will be as indicated in Subsection 10B3.2.10, Load Combinations and Subsection 10B3.2.11, Allowable Stresses.

10B.4.2.2.5 Analytical Techniques. The tank foundations will be designed using static analysis techniques assuming a rigid mat. The mat will be sized such that the allowable settlement and bearing pressure criteria developed from a detailed subsurface investigation will not be exceeded. The foundation will be analyzed assuming a linear soil pressure distribution. The mat will be proportioned such that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading. The minimum factors of safety against overturning and sliding will be 1.5 and 1.1, respectively.

The tanks will be designed by a tank manufacturer in accordance with the ASME code, ANSI code, and the ASTM standards. Gravity and lateral loadings will be transferred to the foundation by integral legs or a saddle support system.

10B.4.3 Equipment

10B.4.3.1 Combustion Turbines

The combustion turbines and accessories will be designed to resist all design loads. The combustion turbines will be constructed of carbon and alloy steels as required by the manufacturer's standards and shall meet all applicable codes and standards.

The foundations will be designed to resist the loadings furnished by the manufacturer and will be constructed of reinforced concrete.

10B.4.3.1.1 Equipment Loads. Equipment loads will be determined by the manufacturer based on project performance criteria. Typical loadings used for design include the following:

- Dead loads
- Live loads
- Operating loads
- Construction loads
- Wind loads
- Seismic loads
- Temperature and pressure loads
- Emergency loads such as turbine accident loads

10B.4.3.1.2 Induced Forces. The combustion turbine and associated equipment will utilize steel anchor bolts, fasteners, welds, and other equipment anchorage devices to resist equipment induced forces.

10B.4.3.1.3 Structural Criteria. The combustion turbine and generator and accessories will be designed to resist project specific design loads and CBC specified loads.

Environmental loading will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads multiplied by the appropriate pressure coefficient from Table No. 16-H of CBC.

The seismic loading and design of the combustion turbine and accessories will be in accordance with project specific criteria and CBC. Seismic loading will be calculated using equivalent lateral forces applied at the center of gravity of the equipment or component in accordance with the criteria specified in Subsection 10B3.6, Seismic Design Criteria.

The inlet air filtration equipment and inlet air duct support structures shall be designed to resist the loading specified in CBC Chapter 16. For the purposes of resisting seismic lateral loads, the inlet air duct support structure will be classified as regular or irregular in accordance with the criteria established in CBC Chapter 16. The procedures for the analysis of regular and irregular structures will be as specified in CBC Chapter 16 and Subsection 10B3.6.1, Buildings and Structures.

Lateral forces on elements of structural and nonstructural components will be determined in accordance with CBC Section 1632, with Z equal to 0.4, I equal to 1.0, and ap and Rp in accordance with CBC Table 16-O. These seismic forces will be combined with forces due to normal operating loads.

Lateral forces on equipment will be determined in accordance with CBC Section 1632 with Z equal to 0.4, I equal to 1.0, and ap and Rp in accordance with CBC Table 16-O. Equipment bases, foundations, support frames, and structural members used to transfer the equipment seismic forces to the main lateral load resisting system will be designed for the same seismic load as the equipment.

Load combinations will be as indicated in Subsection 10B3.2.10, Load Combinations. These load combinations are in addition to those normally used in design and those specified in

applicable codes and standards. For all load combinations, including seismic, the stresses in the structural supporting members and connections will remain in the elastic range.

10B.4.3.1.4 Analytical Techniques. The combustion turbine and auxiliary equipment will be designed and constructed in accordance with applicable requirements of codes and standards referenced in Appendix 10.

10B.4.3.2 Exhaust Ducting and SCR Catalyst

The exhaust ducting and SCR catalyst and accessories will be provided with platforms, stairways, and handrails as required to provide access for operations and maintenance.

The exhaust ducting and SCR catalyst and components will be designed to resist all design loads. The exhaust ducting and SCR catalyst and components will be constructed of carbon and alloy steels as required by the manufacturer's standards and shall meet all applicable codes and standards.

The foundation will be designed to resist the loadings furnished by the manufacturer and will be constructed of reinforced concrete.

10B.4.3.2.1 Equipment Loads. Equipment loads will be determined by the manufacturer and will be based on project performance criteria and applicable codes and standards. Typical loading used for design include the following.

- Dead loads
- Live loads
- Operating loads
- Construction loads
- Wind loads
- Seismic loads
- Hydrostatic loads
- Temperature and pressure loads

10B.4.3.2.2 Induced Forces. The exhaust ducting and SCR catalyst and associated equipment will utilize steel anchor bolts, fasteners, welds, and other equipment anchorage devices to resist equipment induced forces.

10B.4.3.2.3 Structural Criteria. The exhaust ducting and SCR catalyst and associated equipment will be designed to resist project specific design loads and CBC specified loads.

Environmental loading will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads multiplied by the pressure coefficients from Table No. 16-H of CBC.

The seismic loading and design of the exhaust ducting and SCR catalyst and associated equipment will be in accordance with project specific criteria and the CBC. Seismic loading will be calculated using equivalent lateral forces applied at the center of gravity of the equipment or component in accordance with the criteria specified in Subsection 10B3.6, Seismic Design Criteria. The exhaust ducting and SCR catalyst support structure will be designed to resist, at a minimum, the lateral forces specified in CBC Section 1634,

Nonbuilding structures and the applicable criteria of Subsection 10B3.6, Seismic Design Criteria.

For the purpose of resisting lateral seismic forces, the exhaust ducting and SCR catalyst support structure will be classified as regular or irregular in accordance with the criteria established in CBC Chapter 16. The procedures for the analysis of regular and irregular structures will be as specified in CBC Chapter 16 and Subsection 10B3.6.1, Buildings and Structures.

Lateral forces on elements of structural and nonstructural components will be determined in accordance with CBC Section 1632 with Z equal to 0.4, I equal to 1.0 and ap and Rp in accordance with CBC Table 16-O.

Lateral forces on equipment will be determined in accordance with CBC Section 1632 with Z equal to 0.4, I equal to 1.0, and ap and Rp in accordance with CBC Table16-O. Equipment bases, foundations, support frames, and structural members used to transfer the equipment seismic forces to the main lateral load resisting system will be designed for the same seismic load as the equipment.

Load combinations will be as indicated in Subsection 10B3.2.10, Load Combinations. These load combinations are in addition to those normally used in design and those specified in applicable codes and standards. For all load combinations, including seismic, the stresses in the structural supporting members and connections shall remain in the elastic range.

10B.4.3.2.4 Analytical Techniques. The exhaust ducting and SCR catalyst and associated equipment will be designed and constructed in accordance with applicable requirements of codes and standards referenced in Appendix 10B and Appendix 10C. Stamps will be affixed to denote conformance to the appropriate codes.

10B.4.3.3 Power Transformers

The power transformers, transformer equipment, material, and accessories will conform to the applicable standards of ANSI C57.12, National Electrical Manufacturers Association (NEMA) TR1, ANSI/ Institute of Electrical and Electronics Engineers (IEEE) C59.94 and 98, and project specific criteria. The power transformer will be designed, fabricated, and tested in accordance with ANSI C57.12 series, NEMA TR 1, and project-specific criteria.

The foundation will be designed to resist the loading furnished by the manufacturer and will be constructed of reinforced concrete.

10B.4.3.3.1 Foundation Loads. Foundation loads will be furnished by the power transformer manufacturer and will be superimposed with loads for the foundation itself. Typical loadings supplied by the manufacturer include the following.

- Dead loads
- Live loads
- Wind loads
- Seismic loads

10B.4.3.3.2 Induced Forces. The power transformers, transformer equipment, and accessories will utilize steel anchor bolts, fasteners, welds, and other equipment anchorage devices to resist equipment induced forces.

10B.4.3.3.3 Structural System. The transformer will be regarded as a rigid body for foundation design purposes.

10B.4.3.3.4 Structural Criteria. The power transformers, transformer equipment, and accessories will be designed to resist project specific design loads, CBC-specified loads, and loads from applicable codes and standards.

The foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Appendix 10.1A, Subsection 10.1A3.1, Foundations and Subsection 10B3.4, Concrete. The foundation will likely be a soil supported rigid mat. The foundations will incorporate an interconnected integral containment basin capable of holding 110 percent of the transformer coolant contents prior to passage through an oil/water separator.

Environmental loading will be determined in accordance with Subsection 10B3.1, Natural Phenomena. Wind loads will be determined using the velocity pressures specified in Subsection 10B3.2.3, Wind Loads, multiplied by the appropriate pressure coefficients from CBC Table No.16-H.

The seismic loading and design of the power transformers, transformer equipment, accessories, and foundations will be in accordance with project specific criteria and CBC Chapter 16. Loading will be approximated using equivalent lateral forces applied to the center of gravity of the equipment or component using the criteria specified in Seubsction 10B3.6, Seismic Design Criteria.

Lateral forces on equipment will be determined in accordance with CBC Section 1632 with Z equal to 0.4, I equal to 1.0, and ap and Rp in accordance with CBC Table 6-O. Equipment bases, foundations, support frames, and structural members used to transfer the equipment seismic forces to the foundation system will be designed for the same seismic load as the equipment. Load combinations will be as indicated in Subsection 10B3.2.10, Load Combinations. These load combinations are in addition to those normally used in design and those specified in applicable codes and standards. For all load combinations, including seismic, the stresses in the structural supporting members and connections will remain in the elastic range. Structural allowable strengths will be as indicated in Subsection 10B3.2.11, Allowable Stresses.

10B.4.3.3.5 Analytical Techniques. The power transformers, transformer equipment, and accessories will be designed and constructed in accordance with applicable requirements of codes and standards referenced in Appendix 10D, Electrical Engineering Design Criteria.

The power transformer foundation will be designed using static analysis techniques assuming a rigid mat. The mat will be sized such that the allowable settlements and bearing pressure or pile loading criteria developed from a detailed subsurface investigation will not be exceeded. The foundation will be analyzed assuming a linear soil pressure distribution. The mat will be proportioned such that the resultant of the soil pressure coincides as nearly

as possible with the resultant of the vertical loading. The minimum factors of safety against overturning and sliding will be 1.5 and 1.1, respectively.

10B.4.3.4 Miscellaneous Equipment

Where possible, all miscellaneous equipment will be designed to project specific criteria. This miscellaneous equipment includes, but is not limited to, motor control centers, batteries, low voltage power and lighting systems, isolated bus ducts, pumps, lube oil cooling units, fire detection and protection systems, and switchgear. Standardized components such as motors, pumps, small fans, and other similar products that represent manufacturers' standard stock items will not be designed to meet project specific seismic loading criteria.

Miscellaneous equipment will meet all applicable codes and standards as well as the individual manufacturer's standards.

All equipment foundations and supports will be designed to resist project specific loading and the loading furnished by the equipment manufacturer.

10B.4.3.4.1 Foundation Loads. Foundation loads will be furnished by the equipment manufacturers and will be superimposed with loads for the foundation itself. Typical loadings supplied by the manufacturer include the following.

- Dead loads
- Live loads
- Wind loads
- Seismic loads
- Temperature and pressure loads (as applicable)

10B.4.3.4.2 Induced Forces. All miscellaneous equipment will utilize steel anchor bolts, fasteners, welds, and other equipment anchorage devices to resist equipment induced forces.

10B.4.3.4.3 Structural System. Each individual piece of equipment will have its own unique structural system, and it is the responsibility of each manufacturer to assure its adequacy.

10B.4.3.4.4 Structural Criteria. All miscellaneous equipment will be designed to resist project specific and CBC specified loads where possible and loads from applicable codes and standards.

The seismic loading and design of miscellaneous equipment will be in accordance with project specific criteria and CBC Chapter 16, if possible.

Seismic loading will be calculated using equivalent lateral forces applied to the center of gravity of the equipment or component in accordance with the criteria specified in, Subsection 10B3.6, Seismic Design Criteria.

Lateral forces on equipment will be determined in accordance with CBC Section 1632 with Z equal to 0.4, I equal to 1.0, and a_p and R_p in accordance with CBC Table 16-O. Equipment bases, foundations, support frames, and structural members used to transfer the equipment

seismic forces to the main lateral load resisting system will be designed for the same seismic load as the equipment.

Load combinations will be as indicated in Subsection 10B3.2.10, Load Combinations. These load combinations are in addition to those normally used in design and those specified in applicable codes and standards. For all load combinations, including seismic, the stresses in the structural supporting members and connections shall remain in the elastic range. Structural allowable strengths will be as indicated in Subsection 10B3.2.11, Allowable Stresses.

10B.4.3.4.5 Analytical Techniques. All miscellaneous equipment and accessories will be designed and constructed in accordance with applicable requirements of codes and standards.

All structural supports required for the miscellaneous equipment will be designed using static analysis techniques.

10B.5 Hazard Mitigation

The project will be designed to mitigate natural and environmental hazards caused by seismic and meteorological events. This section addresses the structural design criteria used to mitigate such hazards.

10B.5.1 Seismic Hazard Mitigation Criteria

Subsection 8.15 provides the description of the regional seismicity and the seismic risk associated with each of the major faults considering historical magnitude and probability of occurrence. The geologic hazards associated with these faults, when considered in concert with the results and recommendations of the future geologic investigation to be provided in Appendix 10G (at a future date) will be consistent with the design capabilities provided for the facility. The seismic design criteria are implemented through meeting the requirements of Seismic Zone 4 of the CBC.

Specific design features that will be incorporated into the plant to mitigate the identified seismic hazards include the following.

- Appropriate analysis techniques will be employed to calculate structure specific seismic loads.
- Plant structures, equipment, piping, and other components will be designed to resist the project specific seismic loads.
- All equipment will be positively anchored to its supporting structure. Nominal uplift capacity will be provided in the absence of calculated overturning forces.
- Anchorages will be designed to resist the project specific seismic loadings.
- Foundation systems will be selected and designed to minimize the effects of soil liquefaction.
- Adjacent structures will be seismically isolated from one another.

- Structural elements will be designed to comply with special detailing requirements intended to provide ductility.
- Connections for steel structures will have a minimum load carrying capability without regard to the calculated load.
- Lateral and vertical displacements of structures and elements of structures will be limited to specified values.
- The foregoing design features are intended to provide the following degrees of safety for structures and equipment.
  - Resist minor earthquakes without damage. Plant remains operational.
  - Resist moderate earthquakes without structural damage but with some nonstructural damage. Plant remains operational or is returned to service following visual inspection and/or minor repairs.
  - Resist major earthquakes without collapse but with some structural and nonstructural damage. Plant is returned to service following visual inspection and/or minor repairs.

10B.5.2 Meteorological and Climatic Hazard Mitigation

Meteorological and climatic data will form the design basis for the project. Portions of the data and the design bases that pertain to structural engineering have been provided in this Appendix.

Specific design features that will be incorporated into the plant to mitigate meteorological and climatic hazards include the following.

- Structures and cladding will be designed to resist the wind forces.
- Sensitive structures will be designed for wind induced vibrational excitation.
- Roofs will be sloped and equipped with drains to prevent accumulation of rainfall.
- Plant mechanical and electrical equipment will be placed on elevated equipment bases when required.
- The plant site will be graded to convey runoff away from structures and equipment.

The foregoing design features will be incorporated in accordance with applicable codes and standards identified in this Appendix.

The degree of safety offered by these features is consistent with the requirements of the applicable codes and standards and the economic benefits these features provide.

APPENDIX 10C

Mechanical Engineering Design Criteria

APPENDIX 10C

Mechanical Engineering Design Criteria

10C.1 Introduction

This appendix summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of mechanical engineering systems for the project. More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

10C.2 Codes and Standards

The design of the mechanical systems and components will be in accordance with the laws and regulations of the federal government, state of California, and industry standards. The current issue or revision of the documents, at the time of the filing of this Application for Certification (AFC) will apply, unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirements shall apply.

The following codes and standards are applicable to the mechanical aspects of the power facility.

- California Building Code
- California Mechanical Code
- California Plumbing Code
- American Society of Mechanical Engineers Boiler(ASMEB) and Pressure Vessel Code (PVC)
- ASME/American National Standards Institute (ANSI) 1331.1 Power Piping Code
- ASME Performance Test Codes
- ASME Standard TDP-1
- ANSI B16.5, B16.34, and B133.8
- American Gear Manufacturers Association (AGMA)
- Air Moving and Conditioning Association (AMCA)
- American Petroleum Institute (API) - except for electrical requirements
- American Society for Testing and Materials (ASTM)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Welding Society (AWS)
- Cooling Tower Institute (CTI)
- Heat Exchange Institute (HEI)
- Manufacturing Standardization Society (MSS) of the Valve and Fitting Industry
- National Fire Protection Association (NFPA)

10C.3 Mechanical Engineering General Design Criteria

10C.3.1 General

The systems, equipment, materials, and their installation that will be designed in accordance with the applicable codes; industry standards; and local, state, and federal regulations, as well as the design criteria; manufacturing processes and procedures; and material selection, testing, welding, and finishing procedures specified in this section.

Detailed equipment design will be performed by the equipment vendors in accordance with the performance and general design requirements specified by the Engineering, Procurement, and Construction contractor. Equipment vendors will be responsible for using construction materials suited for the intended use.

Asbestos will not be used in the materials and equipment supplied. Where feasible, materials will be selected to withstand the design operating conditions, including expected ambient conditions, for the design life of the plant. It is anticipated that some materials will require replacement during the life of the plant due to corrosion, erosion, etc.

10C.3.2 Pumps

Pumps will be sized in accordance with industry standards. Where feasible, pumps will be sized for maximum efficiency at the normal operating point. Pumps will be designed to be free from excessive vibration throughout the operating range.

10C.3.3 Tanks

Large outdoor storage tanks will not be insulated.

Overflow connections and lines will be provided. Maintenance drain connections will be provided for complete tank drainage.

Manholes, where provided, will be at least 18 inches in diameter and hinged to facilitate removal. Storage tanks will have ladders and cleanout doors as required to facilitate access/maintenance. Provisions will be included for proper tank ventilation during internal maintenance.

10C.3.4 Heat Exchangers

Heat exchangers will be provided as components of mechanical equipment packages and may be shell-and-tube or plate type. Heat exchangers will be designed in accordance with Tubular Exchanger Manufacturers Association (TEMA) or manufacturer's standards. Fouling factors will be specified in accordance with TEMA.

10C.3.5 Pressure Vessels

Pressure vessels will include the following features/appurtenances:

- Process, vent, and drain connections for startup, operation, and maintenance
- Materials compatible with the fluid being handled

- A minimum of one manhole and one air ventilation opening (e.g., handhole) where required for maintenance or cleaning access
- For vessels requiring insulation, shop-installed insulation clips spaced not greater than 18 inches on center
- Relief valves in accordance with the applicable codes

10C.3.6 Piping and Piping Supports

Stainless steel pipe may be Schedule 5S or 10S where design pressure permits. Underground piping may be high-density polyethylene (HDPE) where permitted by code, operating conditions, and fluid properties. In general, water system piping will be HDPE where embedded or underground and carbon steel where above ground.

Threaded joints will not be used in piping used for lubricating oil, and combustion turbine generator (CTG) natural gas service. Natural gas piping components will not use synthetic lubricants. Victaulic, or equal, couplings will be used for low energy aboveground piping, where feasible.

Piping systems will have high point vents and low point drains. Drains with restricting orifices or traps with startup and blowdown drains and strainers/crud traps will be installed in low points of steam lines where condensate can collect during normal operation.

Hose and process tubing connections to portable components and systems will be compatible with the respective equipment suppliers' standard connections for each service.

Stainless steel piping will be used for the lubricating oil system and deionized water system.

An air gap between the recycled water and potable water systems at the recycled water storage tank shall be per the California requirements for recycled water use and preclude contact between the two systems.

10C.3.7 Valves

10C.3.7.1 General Requirements

Valves will be arranged for convenient operation from floor level where possible and, if required, will have extension spindles, chain operators, or gearing. Hand-actuated valves will be operable by one person.

Valves will be arranged to close when the handwheel is rotated in a clockwise direction when looking at the handwheel from the operating position. The direction of rotation to close the valve will be clearly marked on the face of each handwheel.

The stops that limit the travel of each valve in the open or closed position will be arranged on the exterior of the valve body. Valves will be fitted with an indicator to show whether they are open or closed; however, only critical valves will be remotely monitored for position.

Valve materials will be suitable for operation at the maximum working pressure and temperature of the piping to which they are connected. Steel valves will have cast or forged steel spindles. Seats and faces will be of low friction, wear-resistant materials. Valves in

throttling service will be selected with design characteristics and of materials that will resist erosion of the valve seats when the valves are operated partly closed.

Valves operating at less than atmospheric pressure will include means to prevent air in-leakage. No provision will be made to repack valve glands under pressure.

10C.3.7.2 Drain and Vent Valves and Traps

Drain traps will include air cock and easing mechanism. Internal parts will be constructed from corrosion-resistant materials and will be renewable.

Trap bodies and covers will be cast or forged steel and will be suitable for operating at the maximum working pressure and temperature of the piping to which they are connected. Traps will be piped to drain collection tank or sumps and returned to the cycle if convenient.

10C.3.7.3 Low Pressure Water Valves

Low pressure water valves will be the butterfly type of cast iron construction. Cast iron valves will have cast iron bodies, covers, gates (discs), and bridges; the spindles, seats, and faces will be bronze. Fire protection valves will be Underwriters Laboratories (UL)-approved butterfly valves meeting National Fire Protection Association (NFPA) requirements.

10C.3.7.4 Instrument Air Valves

Instrument air valves will be the ball type of bronze construction, with valve face and seat of approved wear-resistant alloy.

10C.3.7.5 Nonreturn Valves

Nonreturn valves in vertical positions will have bypass and drain valves. Bodies will have removable access covers to enable the internal parts to be examined or renewed without removing the valve from the pipeline.

10C.3.7.6 Motor-Actuated Valves

Motor-actuated valves will be fitted with both hand and motor operating gear. The hand and motor actuation mechanisms will be interlocked so that the hand mechanism is disconnected before the motor is started.

Motor actuators will include torque switches to stop the motor automatically when the valve gate has reached the "full open" or "full closed" position.

The motor actuator will be placed in a position relative to the valve that prevents leakage of liquid, steam, or corrosive gas from valve joints onto the motor or control equipment.

10C.3.7.7 Safety and Relief Valves

Safety valves and/or relief valves will be provided as required by code for pressure vessels, heaters, and boilers. Safety and relief valves will be installed vertically. Piping systems that can be over-pressurized by a higher-pressure source will also be protected by pressure relief valves. Equipment or parts of equipment that can be over-pressurized by thermal expansion of the contained liquid will have thermal relief valves.

10C.3.7.8 Instrument Root Valves

Instrument root valves will be specified for operation at the working pressure and temperature of the piping to which they are connected.

10C.3.8 Heating, Ventilating, and Air Conditioning

Heating, ventilating, and air conditioning (HVAC) system design will be based on site ambient conditions specified in Section 1.0.

Except for the HVAC systems serving the control room and administration areas, the systems will not be designed to provide comfort levels for extended human occupancy.

Air conditioning will include both heating and cooling of the inlet filtered air. Air velocities in ducts and from louvers and grills will be low enough not to cause unacceptable noise levels in areas where personnel are normally located.

Fans and motors will be mounted on anti-vibration bases to isolate the units from the building structure. Exposed fan outlets and inlets will be fitted with guards. Wire guards will be specified for belt-driven fans and arranged to enclose the pulleys and belts.

Air filters will be housed in a manner that facilitates removal. The filter frames will be specified to pass the air being handled through the filter without leakage.

Ductwork, filter frames, and fan casings will be constructed of mild steel sheets stiffened with mild steel flanges and galvanized. Ductwork will be the sectional bolted type and will be adequately supported. Duct joints will be leaktight.

Grills and louvers will be of adjustable metal construction.

10C.3.9 Thermal Insulation and Cladding

Parts of the project requiring insulation to reduce heat loss or afford personnel safety will be thermally insulated. Minimum insulation thickness for hot surfaces near personnel will be designed to limit the outside lagging surface temperature to a maximum of 140 degrees Fahrenheit (°F), based on 80°F ambient temperature and 1 mile per hour (mph)/hour (hr) air velocity. Other insulation minimums will be designed to limit the heat loss to approximately 80 British thermal unit per hour per square foot (Btu/hr-ft^2) based on an 80°F ambient condition and 20 mph/hr air velocity.

The thermal insulation will have as its main constituent calcium silicate, foam glass, fiberglass, or mineral wool, and will consist of pre-formed slabs or blankets, where feasible. Asbestos materials will be prohibited. An aluminum jacket or suitable coating will be provided on the outside surface of the insulation. Where a hard-setting compound is used as an outer coating, it will be nonabsorbent and noncracking. Thermal insulation will be chemically inert even when saturated with water. Insulation system materials, including jacketing, will have a flame spread rating of 25 or less when tested in accordance with American Society for Testing and Materials (ASTM) E 84.

Insulation at valves, pipe joints, or other points to which access may be required for maintenance will be specified to be removable with a minimum of disturbance to the pipe insulation. At each flanged joint, the molded material will terminate on the pipe at a

distance from the flange equal to the overall length of the flange bolts to permit their removal without damaging the molded insulation.

Above ground insulated piping will be clad with pebbled or corrugated aluminum of not less than 30 milimeters (mil) thickness and frame reinforced. At the joints, the sheets will be sufficiently overlapped and corrugated to prevent moisture from penetrating the insulation.

Design temperature limits for thermal insulation will be based on system operating temperature during normal operation.

Outdoor and underground insulation, if required, will be moisture resistant.

10C.3.10 Testing

Hydrostatic testing, including pressure testing at 1.5 times the design pressure, will be specified and performed for pressure boundary components where an in-service test is not feasible or permitted by code.

10C.3.11 Welding

Welders and welding procedures will be certified in accordance with the requirements of the applicable codes and standards before performing any welding. Contractor will maintain indexed records of welder qualifications, weld test reports, and weld procedures.

10C.3.12 Painting

Except as otherwise specified, equipment will receive the respective manufacturer's standard shop finish. Finish colors will be selected from among the paint manufacturer's standard colors.

Finish painting of uninsulated piping will be limited to that required by Occupational Safety and Health Administration (OSHA) for safety or for protection from the elements.

Piping to be insulated will not be painted.

10C.3.13 Lubrication

The types of lubrication specified for facility equipment will be suited to the operating conditions and will comply with the recommendations of the equipment manufacturers.

The initial startup charge of flushing oil will be provided by the equipment manufacturer and will be the manufacturer's standard lubricant for the intended service. Subsequently, such flushing oil will be sampled and analyzed to determine whether it can also be used for normal operation or must be replaced in accordance with the equipment supplier's recommendations.

Rotating equipment will be splash lubricated, force lubricated, or self-lubricated. Oil cups will be provided as necessary. Where automatic lubricators are fitted to equipment, provision for emergency hand lubrication will also be specified. Where applicable, equipment will be designed to be manually lubricated while in operation without the removal of protective guards. Lubrication filling and drain points will be readily accessible.

APPENDIX 10D

Electrical Engineering Design Criteria

APPENDIX 10D

Electrical Engineering Design Criteria

10D.1 Introduction

This appendix summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of electrical engineering systems for the facility. More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement, and construction specifications as required by the California Energy Commission (CEC).

10D.2 Codes and Standards

The design of the electrical systems and components will be in accordance with the laws and regulations of the federal government, State of California and industry standards. The current issue or revision of the documents at the time of the filing of this Application for Certification (AFC) will apply, unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirement shall apply.

The following codes and standards are applicable to the electrical aspects of the power facility.

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Anti-Friction Bearing Manufacturers Association (AFBMA)
- Insulated Cable Engineers Association (ICEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Illuminating Engineering Society (IES)
- National Electrical Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- Underwriters Laboratories, Inc. (UL)

10D.3 Switchyard and Transformers

10D.3.1 Switchyard

The switchyard will be located on the west end of the site and will interconnect to Pacific Gas & Electric's (PG&E's) nearby Potrero substation with aboveground aerial cables. The switchyard will be of the air-insulated aluminum bus type and will consist of high voltage SF_6-insulated dead-tank circuit breakers arranged in a ring-bus configuration. Connections to the ring bus nodes will be provided for each generator and for the inter-ties to the utility grid. Each circuit breaker will be equipped with a no load break, air-insulated, disconnect

switch on each side. An isolating disconnect switch will also be installed in each generator transformer connection to the ring bus to allow continuous ring integrity when a transformer is out of service. Air-insulated tubular aluminum bus will be used as the primary bus construction and interconnection material within the switchyard. The buses will be attached to post insulator columns on structural steel supports.

Current and voltage transformers will be located at points within the switchyard to provide for metering and relaying.

Control, protection and monitoring for the switchyard will be located in the switchyard relay room of the electrical building. Monitoring and alarms will be available to the DCS operator workstations in the control room. All protection and circuit breaker control will be powered from the station battery-backed 125 volts direct current (Vdc) system.

The switchyard design will meet the requirements of the National Electrical Safety Code—ANSI C2.

A grounding grid will be provided to control step and touch potentials in accordance with IEEE Standard 80, Safety in Substation Grounding. All equipment, structures and fencing will be connected to the grounding grid of buried copper conductors and ground rods, as required. The substation ground grid will be tied to the plant ground grid.

Lightning protection will be provided by shield wires and/or lightning masts for any overhead lines. The lightning protection system will be designed in accordance with IEEE 998 guidelines.

All faults shall be detected, isolated, and cleared in a safe and coordinated manner as soon as practical to insure the safety of Equipment, Personnel, and the Public. Protective relaying will meet IEEE requirements and will be coordinated with PG&E's requirements.

The ring bus will be provided with over-lapping high impedance differential relay systems. The protection will be designed to maintain ring bus integrity when isolating a faulted node. Each outgoing line to the utility substation 115-kilovolt (kV) bus will be provided with redundant high-speed relay systems with transfer trip capability. Each circuit breaker will be provided with independent breaker failure relay protection scheme. Breaker failure protection will be accomplished by protective and timing relays for each breaker. Each high voltage breaker will have 2 redundant trip coils.

Interface with PG&E's supervisory control and data acquisition (SCADA) system will be provided. Interface will be at the interface terminal box and Remote Telemetry Unit (RTU). Communication between the facility switchyard and the control building to which it is connected will be included.

Revenue metering will be provided on the 115-kV outgoing lines recording net power to or from the PG&E switchyard (bi-directional). The revenue meters and a metering panel will be located in the switchyard relay room.

10D.3.2 Transformers

Each generator will be connected to the 115kV switchyard through a separate 13.8-kV to 115-kV step-up transformer and a generator 15 kV metal-clad vacuum circuit breaker. The

step-up transformers will be designed in accordance with ANSI standards C57.12.00, C57.12.90, and C57.116. The transformers will be two-winding, delta-wye, ONAN/ONFA/ONAF, 65 degrees Celsius (°C) rise. The neutral point of the high voltage (HV) winding wye-connected winding will be solidly grounded. Each main step-up transformer will have metal oxide surge arrestors adjacent to the HV terminals and will have manual de-energized ("no-load") tap changers located in the HV windings.

Facility power will be supplied through unit auxiliary transformers connected to two of the 13.8-kV generator output busses. Two (2) two-winding, delta-wye 13.8-kV to 4.16-kV transformers with low-impedance grounding resistors will be provided.

APPENDIX 10E

Control Engineering Design Criteria

APPENDIX 10E

Control Engineering Design Criteria

10E.1 Introduction

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and installation for instrumentation and controls for the Facility. More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

10E.2 Codes and Standards

The design specification of all work will be in accordance with the laws and regulations of the federal government and the state of California. A summary of general codes and industry standards applicable to design and construction follows.

- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- The Institute of Electrical and Electronics Engineers (IEEE)
- Instrument Society of America (ISA)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- American Society for Testing and Materials (ASTM)

10E.3 Control Systems Design Criteria

10E.3.1 General Plant Control Philosophy

An overall distributed control system (DCS) will be used as the top-level supervisor and controller for the project. DCS operator workstations will be located in the control room of the Administration and Control Building. The intent is for the plant operator to be able to completely run the entire plant from a DCS operator station, without the need to interface to other local panels or devices. The DCS system will provide appropriate hard-wired signals to enable control and operation of all plant systems required for complete automatic operation.

Each combustion turbine generator is provided with its own microprocessor based control system with both local and remote operator workstations, installed on the turbine-generator control panels and in the remote main control room, respectively. All of the functions and controls available on the turbine-generator operator workstations will be replicated on the DCS operator workstations.

Several of the larger packaged subsystems associated with the project include their own programmable logic controller (PLC)-based dedicated control systems. For larger systems

that have dedicated control systems, the DCS will function mainly as a monitor, using network data links to collect, display, and archive operating data.

Pneumatic signal levels, where used, will be 3 to 15 pounds per square inch gauge (psig) for pneumatic transmitter outputs, controller outputs, electric-to-pneumatic converter outputs, and valve positioner inputs.

Instrument analog signals for electronic instrument systems shall be 4 to 20 milliampere, direct current (mA dc).

The primary sensor full-scale signal level, other than thermocouples, will be between 10 millivolts (mV) and 125 volts (V).

10E.3.2 Pressure Instruments

In general, pressure instruments will have linear scales with units of measurement in psig.

Pressure gauges will have either a blowout disk or a blowout back and an acrylic or shatterproof glass face.

Pressure gauges on process piping will be resistant to plant atmospheres.

Pressure test points will have isolation valves and caps or plugs. Pressure devices on pulsating services will have pulsation dampers.

10E.3.3 Temperature Instruments

In general, temperature instruments will have scales with temperature units in degrees Fahrenheit. Exceptions to this are electrical machinery resistance temperature detectors (RTDs) and transformer winding temperatures, which are in degrees Celsius.

Dial thermometers will have 4-1/2- or 5-inch-in-diameter (minimum) dials and white faces with black scale markings and will be every-angle type and bimetal actuated. Dial thermometers will be resistant to plant atmospheres.

Temperature elements and dial thermometers will be protected by thermowells except when measuring gas or air temperatures at atmospheric pressure. Temperature test points will have thermowells and caps or plugs.

RTDs will be either 100 ohm platinum or 10 ohm copper, ungrounded, three-wire circuits (R_{100}/R_0-1.385). The element will be spring-loaded, mounted in a thermowell, and connected to a cast iron head assembly.

Thermocouples will be single-element, grounded, spring-loaded, Chromel-Constantan (ANSI Type E) for general service. Thermocouple heads will be the cast type with an internal grounding screw.

10E.3.4 Level Instruments

Reflex-glass or magnetic level gauges will be used. Level gauges for high-pressure service will have suitable personnel protection.

Gauge glasses used in conjunction with level instruments will cover a range that is covered by the instrument. Level gauges will be selected so that the normal vessel level is approximately at gauge center.

10E.3.5 Flow Instruments

Flow transmitters will be the differential pressure type with the range matching the primary element. In general, linear scales and charts will be used for flow indication and recording.

In general, airflow measurements will be temperature compensated.

10E.3.6 Control Valves

Control valves in throttling service will generally be the globe-body cage type with body materials, pressure rating, and valve trims suitable for the service involved. Other style valve bodies (e.g., butterfly, eccentric disk) may also be used when suitable for the intended service.

Valves will be designed to fail in a safe position.

Control valve body size will not be more than two sizes smaller than line size, unless the smaller size is specifically reviewed for stresses in the piping.

Control valves in 600-class service and below will be flanged where economical. Where flanged valves are used, minimum flange rating will be ANSI 300 Class.

Severe service valves will be defined as valves requiring anticavitation trim, low noise trim, or flashing service, with differential pressures greater than 100 psid.

In general, control valves will be specified for a noise level no greater than 90 decibel A-rated (dBA) when measured 3 feet downstream and 3 feet away from the pipe surface.

Valve actuators will use positioners and the highest pressure, smallest size actuator, and will be the pneumatic-spring diaphragm or piston type. Actuators will be sized to shutoff against at least 110 percent of the maximum shutoff pressure and designed to function with instrument air pressure ranging from 60 to 125 psig.

Handwheels will be furnished only on those valves that can be manually set and controlled during system operation (to maintain plant operation) and do not have manual bypasses.

Control valve accessories, excluding controllers, will be mounted on the valve actuator unless severe vibration is expected.

Solenoid valves supplied with the control valves will have Class H coils. The coil enclosure will normally be a minimum of NEMA 4 but will be suitable for the area of installation. Terminations will typically be by pigtail wires.

Valve position switches (with input to the DCS for display) will be provided for motor-operated valves (MOVs) and open/close pneumatic valves. Automatic combined recirculation flow control and check valves (provided by the pump manufacturer) will be used for pump minimum-flow recirculation control. These valves will be the modulating type.

10E.3.7 Instrument Tubing and Installation

Tubing used to connect instruments to the process line will be 3/8- or 1/2-inch-outside-diameter copper or stainless steel as necessary for the process conditions.

Instrument tubing fittings will be the compression type. One manufacturer will be selected for use and will be standardized as much as practical throughout the plant.

Differential pressure (flow) instruments will be fitted with three-valve manifolds; two-valve manifolds will be specified for other instruments as appropriate.

Instrument installation will be designed to correctly sense the process variable. Taps on process lines will be located so that sensing lines do not trap air in liquid service or liquid in gas service. Taps on process lines will be fitted with a shutoff (root or gauge valve) close to the process line. Root and gauge valves will be main-line class valves.

Instrument tubing will be supported in both horizontal and vertical runs as necessary. Expansion loops will be provided in tubing runs subject to high temperatures. The instrument tubing support design will allow for movement of the main process line.

10E.3.8 Pressure and Temperature Switches

Field-mounted pressure and temperature switches will have either NEMA Type 4 housings or housings suitable for the environment.

In general, switches will be applied such that the actuation point is within the center one-third of the instrument range.

10E.3.9 Field-Mounted Instruments

Field-mounted instruments will be of a design suitable for the area in which they are located. They will be mounted in areas accessible for maintenance and relatively free of vibration and will not block walkways or prevent maintenance of other equipment. Freeze protection will be provided.

Field-mounted instruments will be grouped on racks. Supports for individual instruments will be prefabricated, off-the-shelf, 2-inch pipestand. Instrument racks and individual supports will be mounted to concrete floors, to platforms, or on support steel in locations not subject to excessive vibration.

Individual field instrument sensing lines will be sloped or pitched in such a manner and be of such length, routing, and configuration that signal response is not adversely affected.

Local control loops will generally use a locally mounted indicating controller (pressure, temperature, flow, etc.).

Liquid level controllers will generally be the nonindicating, displacement type with external cages.

10E.3.10 Instrument Air System

Branch headers will have a shutoff valve at the takeoff from the main header. The branch headers will be sized for the air usage of the instruments served, but will be no smaller than 3/8 inch. Each instrument air user will have a shutoff valve and filter at the instrument.

APPENDIX 10F

Chemical Engineering Design Criteria

APPENDIX 10F

Chemical Engineering Design Criteria

10F.1 Introduction

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and installation for chemical engineering systems for the Facility. More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

10F.2 Design Codes and Standards

The design and specification of all work will be in accordance with the laws and regulations of the federal government and the state of California. Industry codes and standards partially unique to chemical engineering design to be used in design and construction are summarized below.

- ANSI — American National Standards Institute
- ANSI B31.1 — Power Piping Code
- ASME — American Society of Mechanical Engineers
- ASME — Performance Test Code 31, Ion Exchange Equipment
- ASTM — American Society for Testing and Materials
- ASTM D859-94 — Referee Method B for Silica as SiO_2
- ASTM D888-96 — Referee Method A for Dissolved Oxygen
- ASTM D513-96 — Referee Method D for CO_2
- OSHA — Occupational Safety and Health Administration
- SSPC — Steel Structures Painting Council Standards
- SSPC SP3 — Power Tool Cleaning
- SSPC SP7 — Brush-Off Blast Cleaning
- SSPC SP1 — Solvent Cleaning
- SSPC SP6 — Commercial Blast Cleaning
- SSPC SP5 — White Metal Blast Cleaning
- UL — Underwriters Laboratories
- AWWA — American Waterworks Association
- AWWA WWA 2540-95 — Method C for Total Dissolved Solids (TDS)

Other recognized standards will be used as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

10F.3 General Criteria

10F.3.1 Design Water Quality

10F.3.1.1 Circulating Water

Recycled water produced by the recycled water treatment facility at the San Francisco Electric Reliability Project (SFERP) will supply the project with circulating water makeup. Data from the City of San Francisco Southeast Wastewater Treatment Plant (SEWWTP) indicate that the effluent from the recycled water treatment facility will have the characteristics defined in Subsection 8.14, Water Resources.

10F.3.1.2 Service Water

Recycled water from the recycled water treatment facility will be used to supply the project with all general service water requirements such as non-potable sanitary as well as process needs.

A typical water analysis range for this water is presented in Subsection 8.14, Water Resources.

10F.3.1.3 Water Treatment

Recycled water from the recycled water treatment facility will be supplied to the plant Water Treatment System. The high-quality effluent from the Water Treatment System will serve as injection water to the gas turbine oxides of nitrogen (NOx) reduction system. In addition, treated water will be used also to supply water for turbine power augmentation, turbine water wash, and various uses during unit startup.

Treated water will be the highest quality practical. Minimum quality requirements will be as follows.

- Total dissolved solids—3mg/l
- Silica as SiO_2—0.1 mg/l
- Specific conductance at demineralizer effluent—0.5 µS/cm
- pH—6.5 to 7.5

10F.3.1.4 Construction Water

Water for use during construction will be supplied from the City's potable water system.

10F.3.1.5 Fire Protection Water

The source of water for fire protection will be from a connection to the City's fire water system located in 23rd Street.

10F.3.2 Chemical Conditioning

10F.3.2.1 Circulating Water System Chemical Conditioning

Circulating water chemical conditioning will consist of chemicals to minimize corrosion and to control the formation of mineral scale and biofouling. Corrosion and scaling will be controlled by the use of sulfuric acid for alkalinity adjustment in conjunction with

inhibitors, as required, for scale and corrosion control. Chlorination utilizing sodium hypochlorite will be used to minimize biofouling of the cooling tower.

10F.3.3 Chemical Storage

10F.3.3.1 Storage Capacity

Chemical storage tanks will, in general, be sized to store a minimum of 1.5 times the normal bulk shipment.

10F.3.3.2 Containment

Chemical storage tanks containing corrosive or hazardous fluids will be surrounded by curbing. Curbing and drain piping design will allow a full tank capacity spill without overflowing the curbing. For multiple tanks located within the same curbed area, the largest single tank will be used to size the curbing and drain piping.

10F.3.3.3 Closed Drains

Waste piping for volatile liquids and wastes with offensive odors will use closed drains to control noxious fumes and vapors.

10F.3.3.4 Coatings

Tanks, piping, and curbing for chemical storage applications will be provided with a protective coating system. The specific requirements for selection of an appropriate coating will be identified prior to equipment and construction contract procurements.

10F.3.4 Wastewater Treatment

Any plant process wastewaters will be collected in the plant wastewater collection system for offsite discharge. Plant effluent to be discharged offsite will meet all applicable criteria of federal, state, and local permits.

Sanitary wastewater will be collected and sent to the city sanitary sewer system through a connection to the line in 23rd Street.

APPENDIX 10G

Geologic and Foundation Design Criteria

APPENDIX 10G

Geologic and Foundation Design Criteria

10G.1 Introduction

This appendix includes the results of past documentation regarding subsurface investigation, and geotechnical assessment for the project to support the Application for Certification (AFC).

This appendix contains a description of the site conditions, and preliminary foundation related subsurface conditions. Soil related hazards addressed include soil liquefaction, hydrocompaction (or collapsible soils), and expansive soils. Preliminary foundation and earthwork considerations are addressed based on the results of general published information available for the project area and collected for the AFC, and established geotechnical engineering practices.

Information contained in this appendix reflects the codes, standards, criteria, and practices generally used in the design and construction of site and foundation engineering systems for the facility. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications.

10G.2 Site Conditions

The site is located on 23rd Street near the intersection of 23rd Street and Illinois Street, bounded by Humboldt Street to the north. The site topography is relatively flat. Elevations range from 22 to about 30 feet above sea level. The site currently drains towards the south into the existing combined sewer system in 23rd Street. The general area is generally flat terrain

Currently concrete or asphalt and empty buildings remaining from a previously sited power plant cover the property.

10G.3 Site Subsurface Conditions

10G.3.1 Stratigraphy

Generalized stratigraphy is discussed in Subsection 8.15. Borings will be performed at the project site to verify the soil consistency and characteristics.

10G.3.2 Seismicity/Ground Shaking

The project site is subject to the probability of seismic activities. No known faults traverse through the local soils in or near the site. The San Francisco Bay occupies a wide linear northwest trending structural depression within the Coast Range Geomorphic Province of northern California. The depression, called the San Francisco Bay—Santa Clara Valley (SFB-SCV) depression, is bounded by the Santa Cruz Mountains to the southwest and the East Bay Hills and Diablo Range to the northeast. The Coastal Range Province consists of

sedimentary, metamorphic, volcanic, and igneous rocks predominately ranging in age from the Jurassic/Cretaceous to recent.

Within the San Francisco Bay are located two major fault systems in a historically active tectonic setting—the San Andreas Fault in the west and the Hayward fault in the east. The project site is located approximately 3 miles east of the San Andrea Fault and about 14 miles west of the Hayward Fault.

San Francisco Electric Reliability Project (SFERP) is located within the San Francisco Marin Structural Block, bounded on the east by the Hayward Fault and on the west by the San Andreas Fault. During the last 2 million years, the San Francisco Block has tilted with its eastern portion subsiding to form the elongate depression now occupied by the San Francisco Bay. During the same period, the Santa Cruz Mountains, Diablo Range, and Berkeley Hills have been uplifted.

The bedrock of the San Francisco Block consists of Jurassic-Cretaceous rock, belonging to the Franciscan Assemblage and Great Valley sequence. These rocks include graywacke sandstone, conglomerate, chert, serpentinite, cataclasite, and altered volcanics of the Franciscan Assemblage and sandstone and shale of the Great Valley Sequence.

Based on previous studies and test borings performed at the Potrero site indicate the presence of man-made fill and Bay Mud deposits overlying relatively shallow serpentine rock of the Franciscan Formation. The formation's surface is ridge-like in nature across the plant site.

The project site is susceptible to ground shaking during major earthquakes from the San Andreas or Hayward Faults. The seismic risk to structures depends upon the distance to the epicenter; the characteristics of the earthquake, the geologic, groundwater, and soil conditions underlying the structures and their vicinity. The site is located in Seismic Zone 4.

10G.3.3 Ground Rupture

Ruptures along the surface trace of a fault tend to occur along lines of previous faulting. There is no evidence of potentially active fault trace at the nearby site; and thus the primary hazard of surface rupture at the project site is expected to be negligible. However, a ground rupture study at the project site should be carried out to verify this assumption.

10G.3.4 Ground Water

Groundwater is expected to occur at approximately 30 feet below ground surface. The groundwater table has to be determined and verified at the project site.

10G.4 Assessment of Soil-Related Hazards

10G.4.1 Liquefaction

Soil liquefaction is a process by which loose, saturated, granular deposits lose a significant portion of their shear strength due to pore water pressure buildup resulting from cyclic loading, such as that caused by an earthquake. Soil liquefaction can lead to foundation bearing failures and excessive settlements when:

- The design ground acceleration is high
- The water level is relatively shallow

- Low Standard Penetration Test (SPT) blow counts are measured in granular deposits (suggesting low soil density)

Previous investigations indicated primarily fill and Bay Mud overlying bedrock, with fill being relatively thick in areas but containing large proportions of rubble and debris. In portions of the site where bedrock is shallow and overlain by fill, the potential for liquefaction would be very low. In the easternmost portion of the site where heterogeneous granular fill is considerably thicker, the potential for liquefaction would be locally high. However, this must be verified by the subsurface investigation as mentioned above.

10G.4.2 Expansive Soils

Soil expansion is a phenomenon by which clayey soils expand in volume as a result of an increase in moisture content, and shrink in volume upon drying. Expansive soils are usually identified with index tests, such as percentage of clay particles and liquid limit. It is generally accepted that soils with liquid limits larger than about 50 percent, i.e., soils that classify as high plasticity clays (CH) or high plasticity silts (MH), may be susceptible to volume change when subjected to moisture variations.

Previous data indicates that fill and Bay Mud overburden soils will exhibit no expansive properties. Core samples of the serpentine rock will be taken to examine for mineral type and the presence of sheared jointing. Rock excavation would have to consider possible expansion of clay-filled joints as a result of stress relief. The potential problems with the serpentine rock if left undisturbed are remote. A soil investigation will be performed at the project site.

10G.4.3 Collapsible Soils

Soil collapse (hydrocompaction) is a phenomenon that results in relatively rapid settlement of soil deposits due to addition of water. This generally occurs in soils having a loose particle structure cemented together with soluble minerals or with small quantities of clay. Water infiltration into such soils can break down the interparticle cementation, resulting in collapse of the soil structure. Collapsible soils are usually identified with index tests, such as dry density and liquid limit, and consolidation tests where soil collapse potential is measured after inundation under load.

Based on the available data, the potential for soil collapse at the site is expected to be remote. However, it has to be verified by testing of the soil samples retrieved from borings.

10G.5 Preliminary Foundation Considerations

10G.5.1 General Foundation Design Criteria

For satisfactory performance, the foundation of any structure must satisfy two independent design criteria. First, it must have an acceptable factor of safety against bearing failure in the foundation soils under maximum design load. Second, settlements during the life of the structure must not be of a magnitude that will cause structural damage, endanger piping connections or impair the operational efficiency of the facility. Selection of the foundation type to satisfy these criteria depends on the nature and magnitude of dead and live loads, the base area of the structure and the settlement tolerances. Where more than one

foundation type satisfies these criteria, then cost, scheduling, material availability and local practice will probably influence or determine the final selection of the type of foundation.

An evaluation of the information collected for the AFC indicates that no adverse foundation-related subsurface and groundwater conditions would be encountered that would preclude the construction and operation of the proposed structures. The site can be considered suitable for development of the proposed structures, pursuant to completion of a geotechnical investigation, and the preliminary foundation and earthwork considerations discussed in this appendix.

10G.5.2 Shallow Foundations

Completion of the geotechnical investigation will determine if the proposed structures can be supported directly on the native soils. Shallow foundation construction will require the earthwork measures discussed in Subsection 10G7.

Previous borings suggest there is a significant variation in the depth to bedrock at the Potrero site, in come areas over lateral distances of only a few feet. Depending on the locations/layout or orientation of the facility, it may occur that a relatively small amount of fill and Bay Mud excavation may allow placement of a thickened mat to support certain components directly on the bedrock. As an alternative, excavation and dewatering to remove a moderate thickness of fill and Bay Mud may facilitate founding of components on a very dense controlled backfill. Mass pours and dense backfill would have to accommodate an allowable bearing pressure of a least 3-4 kilopounds per square foot (ksf). However, uplift requirements of the foundation would still have to be addressed, possibly by bedrock anchors.

The decision on whether or not to employ shallow-bearing foundations to support the lighter plant components would also be based on the uniformity, strength, compressibility, and thickness of the fill and Bay Mud overlying the bedrock. If some very slight structures might be placed on shallow foundations, allowable bearing pressures will include a factor of safety against bearing capacity failure of at least 3.0. Tolerable total settlements are expected to be limited to about 1 inch, and differential settlement between adjacent structures generally less than ½ inch. Aboveground steel water tanks can tolerate several times those magnitudes.

Footings for small/light structures are sized according to allowable bearing capacity and certain construction standards. On sandy soils, a degree of confinement is required to develop bearing capacity. Thus, minimum widths of about 2 feet for wall footings and 3 feet for isolated column footings are generally specified even through the full allowable bearing capacity may not be reached under very light loading.

10G.5.3 Deep Foundations

Both the variable thickness and low consistency (low strength and high compressibility) of the Bay Mud deposits suggest that a foundation consisting of short piles or caissons may be required to support virtually all heavy components of the SFERP. A detailed testing/boring program will be conducted to determine depth to bedrock in the specific loading areas.

A foundation report will be issued which addresses foundation selection and installation particular to the soil conditions under the major components. The character of the fill material, and range of thickness form a few feet up to 40 feet, also dictate that the method of installation

and pile type selection for the deep foundation account for variable lengths and obstructions that present hard driving conditions. The overburden soils will probably contribute very little reliable side-support or skin friction component to a pile foundation at this site. The SPT values obtained in the fill are not reliable as a measure of soil consistency if the fill contains construction debris and random common fill dumped in an uncontrolled fashion.

A necessary component of selecting and installing deep foundations is the design and implementation of a pile test program particular to the pile type, required loading, and bearing material. Since test borings may not define the full range of soil conditions at a site, nor lab testing measure strength of all soil involved, test piles are driven/installed at several locations on site prior to production driving. Through use of full-scale load tests or PDA (pile driving analyzer) testing, the estimated load capacity of a singular pile can be verified or adjusted as necessary, often measuring both end bearing and friction components.

Under most conditions, the factor of safety against bearing capacity failure must be at lease 2.0 for deep foundations. When high lateral and uplift loads are important (the stack as an example), the testing program is also designed to measure this performance as well. Load-deflection curves are used for lateral capacity verification, and uplift or pull-out tests measure skin friction performance alone, usually designed for a factor of safety of at least 3.0. Individual pile capacities are adjusted for group effects based on pile center-to-center spacings and soil strength moduli.

Liquefaction potential can affect foundation performance even for deep foundations that extend through the liquefiable soils to firm strata below. Liquefaction is a temporary quick condition which reduces the strength of submerged granular soils to virtually zero. Under this condition, the side or skin friction support on piles can be temporarily lost, and the pile foundation must be designed to derive added load capacity through extra embedment or tip dimension.

10G.5.4 Corrosion Potential and Ground Aggressiveness

Corrosivity tests should be conducted to determine whether the site soils to be noncorrosive or corrosive for buried steel based on the chloride content and pH values.

10G.6 Preliminary Earthwork Considerations

10G.6.1 Site Preparation and Grading

There are existing buildings, structures, and foundations that will be demolished and the debris removed. This will be extensive and the amount of material removed may affect the final elevation as well as establish the need for fill.

Site grading may include fill to bring the site to a final grade. The site fill work should be performed as detailed below. All soil surfaces to receive fill should be proof rolled with a heavy vibratory roller or a fully loaded dump truck to detect soft areas.

10G.6.2 Temporary Excavations

It is anticipated that confined temporary excavations at the site will be required during construction. All excavations should be sloped in accordance with requirements. Sheet

piling could also be used to support any excavation. The need for internal supports in the excavation will be determined based on the final depth of the excavation. Any excavation below the water table should be dewatered using well points installed prior to the start of excavation.

10G.6.3 Backfill Requirements

All fill material must be free of organic matter, debris, or clay balls, with a maximum size not exceeding 2 inches. Structural fill must also be well graded and granular. Granular material with similar specifications can be used for pipe bedding, except that the maximum size should not exceed 1/2 inch.

Structural fill should be compacted to at least 95 percent of the maximum dry density as determined by American Society for Testing and Materials (ASTM) D 1557 when used for raising the grade throughout the site, below footings or mats, or for rough grading. Fill placed behind retaining structures may be compacted to 90 percent of the maximum dry density as determined by ASTM D 1557. Initially, structural fill should be placed in lifts not exceeding 8 inches loose thickness. Thicker lifts may be used pursuant to approval based on results of field compaction performance. The moisture content of all compacted fill should fall within 3 percentage points of the optimum moisture content measured by ASTM D 1557, except compact the top 12 inches of subgrade to 95 percent of ASTM D 1557 maximum density.

Pipe bedding can be compacted in 12-inch lifts to 90 percent of the maximum dry density as determined by ASTM D 1557. Common fill to be placed in remote and/or unsurfaced areas may be compacted in 12-inch lifts to 85 percent of the maximum dry density as determined by ASTM D 1557.

10G.7 Inspection and Monitoring

A California-registered Geotechnical Engineer or Engineering Geologist should monitor geotechnical aspects of foundation construction and/or installation, and fill placement. At a minimum the Geotechnical Engineer/Engineering Geologist should monitor the following activities:

- All surfaces to receive fill should be inspected prior to fill placement to verify that no pockets of loose/soft or otherwise unsuitable material were left in place and that the subgrade is suitable for structural fill placement.
- All fill placement operations should be monitored by an independent testing agency. Field compaction control testing should be performed regularly and in accordance with the applicable specification to be issued by the Geotechnical Engineer.
- The Geotechnical Engineer must witness all pile load testing and initial stages of production pile installation.
- Settlement monitoring of significant foundations and equipment is recommended on at least a quarterly basis during construction and the first year of operation, and then semi-annually for the next 2 years.

10G.8 Site Design Criteria

10G.8.1 General

The project will be located in the City (City) and County (County) of San Francisco, California. The approximate 4.5-acre site is relatively flat, with existing permanent type of structures, which will be demolished except for the metering building. The site would be accessible from 23rd Street.

10G.8.1.2 Datum

The site grade varies between El. 22 to 30 feet, mean sea level, based on an American Land Title Association (ALTA) survey. Final site grade elevation will be determined.

10G.8.2 Foundation Design Criteria

10G.8.2.1 General

Reinforced concrete structures (spread footings, mats and deep foundations) will be designed consistent with Appendix 10B.

Allowable soil bearing pressures for foundation design will be in accordance with this Appendix.

10G.8.3 Ground Water Pressures

Hydrostatic pressures due to ground water or temporary water loads will be considered.

10G.8.4 Factors of Safety

The factor of safety for structures, tanks and equipment supports with respect to overturning, sliding, and uplift due to wind and buoyancy will be as defined in Appendix 10B, Structural Engineering Design Criteria.

10G.8.5 Load Factors and Load Combinations

For reinforced concrete structures and equipment supports, using the strength method, the load factors and load combinations will be in accordance with Appendix 10B, Structural Engineering Design Criteria.

10G.9 References

California Building Code 2001.